

Feathered Jackasses

*The penguins of the
South African islands*

By ELEANOR ELLIOTT
ULLMANN

ALL penguins are not Eskimos. To associate penguins with Africa may appear strange, yet one hundred and twenty miles north of Africa's southernmost cape, penguin islands are found in the warm waters of the South Atlantic. Since the cold light of Antarctic expeditions has been focused upon the penguin, half of the world has not stopped to realize that all of them do not inhabit frigid areas, but that some species are at home in warm, almost subtropical locations during their nesting seasons.

The approach to the penguin islands is by way of a small sea coast village, Saldanha Bay, which lies northwest of Capetown. Saldanha is an excellent little harbor for fishing smacks and whaling vessels on this almost harborless coast of South Africa.

Emerging from the Lesser Karoo—which is not the grandchild of a kangaroo but South Africa's way of saying a "small desert"—we dusted up the road through a village of white adobe houses to a neat white hostel overlooking the blue waters of Saldanha Bay. Would we have tea? If we had not looked distinctly American the tea would have appeared without the question, for tea is the water of life to the white inhabitants of Africa. Tea, shrouded in a padded "cozy" like an old lady in her winter bonnet, comes visiting regularly three or four times a day, a necessity of life. One might have pondered on the good old American custom of minted *iced* tea at such a hot moment, but he would have been considered demented had he voiced such a thought. Ice? This was a desert sea coast town in South Africa in the midst of its summer.

Even the orange, white and blue flag of the Union of

South Africa looked wilted with the heat of the day as it hung like limp lettuce over the wooden shack that bore the sign "Police Station—Politie Kantoor". This bilingual business was becoming amusing. Apparently there was not a Dutchman in a tulip patch who could not speak English, but every sign and advertisement here, even as in Capetown, speaks in two tongues.

The simple little hotel was furnished with archaic tables and chairs of no period whatever, and a plethora of hat trees laden with head gear bespoke the fact that heads go covered always under the rays of Africa's summer sun. The heat was still dripping but we knew from the silk petticoat rustle of the sycamore tree in the court yard that the South Atlantic was about to send in its evening breeze. So leaving our helmets hanging like paw-paw melons on a leafless tree, we strolled out to a promontory of land where the cold white spray of the sea broke over the rocks and rose like fountains into the iridescent dusk of the early evening.

At six o'clock in the morning the *Mayflower* was docked alongside a wharf that was ankle deep with drying fishnets. Being finless creatures, we managed to avoid being caught in them and climbed over the rail of this little fishing smack. Its engine sputtered, yawned and belched forth unburnt petrol before its black skipper finally persuaded it that morning had dawned and that it was time to be on its way to the penguin islands. It was a glorious morning under a sky that reminded one of the blue flax that opens fresh each day with the dawn.

Marcus Island, the isle of the penguins, is under government protection because of the guano obtained from it. Guano, a polite expression for solidified penguin



WITHOUT VEGETATION OF ANY KIND, MARCUS ISLAND IS BLACK AND WHITE IN COLOR, AND THE PENGUINS APPEAR TO HAVE CHOSEN A HOME WISELY SINCE THEY FIT THE LANDSCAPE

dung, is a valuable fertilizer. Each day during the season for the collection of guano upon the island, the young Dutch caretaker comes here to supervise the digging, bagging and shipping of this precious excrement. Aside from the small house that shelters the caretaker, the penguins are undisturbed by human occupation. In order to keep them in this placid state, the government demands a permit for one to land on this island. The permit was printed in both Dutch and English, showing that the two tongues of South Africa move cheek by jowl even into the sea. We wondered whether we should find the penguins divided in their national allegiance and using a dual language.

To land at Marcus, when the tide is low, one comes ashore from the *Mayflower* in a dinghy, and approaches, stern first, a large wet rock covered with periwinkles. A rope ladder suspended from the jetty high above, reaches to the slippery rock and the arrival must be quick enough to be a few rungs up the swinging rope ladder before the next swell washes him into the sea.

As we left the jetty, the members of the "Welcome Committee", which had strayed from the penguin flock, arrived to meet us. Their diminutive dignity and aloofness assisted their beady little eyes in creating an impression of superiority over us featherless bipeds. Visitors are so rare at their private domain that they are viewed with suspicion on general principles.

Marcus Island is about 25 morgen in the eyes of a Dutchman, or about 50 acres, Britishly-speaking. Much of it is covered with delicate mussel shells strewn six to seven feet deep in some places on the island. They crunch under foot like kernels of popcorn, as one walks over them. These empty shells of the lowly mollusks have

come to this final resting place in a violent descent from the sky. The sea gulls that hover over the island like gangsters, to pounce upon penguin chicks left unprotected by their parents, supply themselves with a diet of mussels, picked up after being washed ashore by the tide. Then, flying high over the island, they drop the mollusks on the rocks below them, where they split open like nuts. This food is the black bread of the gulls; a tender penguin chick or an unprotected egg the real delicacies.

Botanically speaking, Marcus Island is no Eden. It is a nude rocky island devoid of any vegetation. Not even a scrub bush provides shelter. It is a study in black and white. Some of its rocky formation is pure white and other parts are a soft black. The little penguins seem to have picked for their nesting place an environment suited to their black and white personalities. They blend into the scenery as a moth simulates the color of the bark upon which it rests.

If you are an ornithologist, forbear to read further, for this is not a scientific monograph on the species *Spheniscus demersus*. It is merely a friendly call on Mynheer and Mevrouw Penguin, their offspring and their neighbors Lord and Lady Penguin, all of whom in common parlance are known as the "Jackass Penguins".

Science calls them birds. They lay eggs, hatch their young and wear an outfit of feathers like the covering of an old plush sofa. One visualizes a bird as a creature of the air, soaring, dipping, adding joy to the world by his musical accomplishments. Yet these birds are confined to the earth and water and cannot project themselves into the atmosphere. Their wings are not wings but little flippers, and their solid little eight- or nine-pound bodies are not designed for aeronautics. As for their vocal ac-

"THIS MULTITUDE OF FEATHERED RELATIONS LIVING IN HARMONIOUS UNITY WITH EACH OTHER, EVEN ON A BARREN ISLAND, CONTAINS A LESSON TO MANKIND"

complishments, the noise they emit is akin to the bray of an ass. Their short stiff legs and webbed feet serve them well in and under the sea, but on land they do not promote a graceful carriage. Picture to yourself a very short, fat man with arthritis in his knees hobbling along with all the dignity he can muster and you will catch the rhythm of the penguin's gait, for it is rhythmic even though far from elegant.

"A jolly fine friend you are," brayed Lord Penguin as he eyed us from a distance of about four feet. We had inched up on him and several thousand of his relatives with no attempt to hide our amusement over them. The bright red half-moon over the eye of this particular species of penguin gives him at times the appearance of being bleary-eyed. But this time there was no doubt about the fiery red look of his eye. "Jolly fine, indeed! Since you think we are just clowns, with your gracious permission we will give you a short exhibition of swimming, diving, undersea swimming and fishing. To top it off, I shall return with a fish for Lady Penguin who at the moment is sitting not too far distant playing thermostat to our egg."

Regarding us as nothing more than parvenus, he and his relatives and friends turned their little black backs upon us, and, with their white shirt fronts unruffled, they wobbled down off the rocks to the sandy beach and scampered into the sea. Some of the yearlings, in their dull gray attire, not yet having attained the mature age that brings the privilege of wearing the full dress suit



of black and white, could not keep up with their parents, who seemed eager to display their talents. Like little sea lions the youngsters fell forward and used their wing flippers to propel themselves towards the water's edge where a wave caught them and set them afloat.

The penguins covered the water in such numbers that they appeared to have been sown broadcast over the blue surface by some master hand. No majestic flotilla ever compared with this little fleet in grace and rhythm of movement. But within a few moments most of them had disappeared with a sinuous dive underneath the water in search of the promised fish.

A sharp snap, like the click of castanets, opened our eyes to the fact that if we had been one step nearer to Lady Penguin, who was sitting guard over the embryonic Honorable Penguin, we should have been minus one good-sized piece of lower limb. There is real feeling in the manner with which a female penguin snaps her bill at any object within reach when she feels that the sanctity of her nest is being violated. This is scarcely a seemly performance, especially in view of the fact that she spends little or no energy in constructing a nest worthy of the name. Here and there in the hard clay ground a small opening has been scooped out with barely sufficient coverage for protection in case of an air raid.

In the most luxurious of these domiciles one may find an old piece of hard seaweed. But, in general,



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"AS WE LOOKED BACK ON ITS UNIQUE INHABITANTS IN THEIR BLACK AND WHITE HABILIMENTS, THEY SALTED AND PEPPERED THE TERRAIN LIKE A SCOTCH TWEED"

these nests have bare clay floors, which Mevrouw or Lady Penguin needs only to houseclean with the swish of her stubby tail. Less ambitious couples are satisfied with a mere indentation on the surface of the clay in which to cradle their offspring. Have you ever lain on a sand beach and scooped out a bit here and there in order to make a comfortable form-fitting depression? You can appreciate the twisting, turning and polishing of curves required in order to excavate a nest suited to the combined contours of a penguin and two large eggs. In this exposed position there is no protection for the nest except that given by the female and her mate.

For once, the male of the species is not more brilliant than the female. They are identical in color. For lack of a colorful excuse, the male must share the nest duties. It is difficult to distinguish his Lordship from her Ladyship except that occasionally the female may be the smaller of the two.

The hen usually lays two eggs, but if she produces one chick alive, her batting average is considered good, since the ever-present sea gulls threaten her eggs continually. But her troubles continue even after the chicks are hatched, and parental protection cannot be relaxed until a penguin chick can fend for itself.

Over a pace sat Mevrouw Penguin looking smug and offish. This attitude soon turned to one of defense as we approached her, for she had a perfect batting average to date—two live chicks huddled under her thick white bosom—and she would not countenance any interference with such a noble record of penguin motherhood. Keeping her chicks well concealed, she stretched out her short neck to an unbelievable length, and, with her red-crowned eye upon us, wove her neck back and forth in a snake-like fashion, braying meantime in her ugliest voice in an effort to frighten away the intruders.

There was pathos, even in the bray, so we wandered away to watch from a respectful distance another mother in the throes of feeding her chick. The penguin chick, like the human baby, must have its food reduced to a pulp. The adult penguin accomplishes this process by first digesting the fish and then regurgitating an oily mass into the mouth of the young one. This duty, as well as the task of guarding the eggs and hatching and educating the young, is divided between the two devoted parents.

Such cooperative partnership seems to lead to a peaceful domesticity on the island. Bickering sometimes occurs when love is young and bachelors are courting. Most of the courting, however, is done at sea before they come to the islands to nest. This multitude of feathered relations living in harmonious unity with each other, even on a barren island, contains a lesson to mankind, particularly in these days.

By now the flotilla was reappearing on the surface of the water. They had not only risked a return to shore, but courted our approval of their exhibition. With their feather coats sleek and dressed down by the salt water, they shook their little flippers and approached us with the self importance of a midshipman. Having thus re-established their superiority, they proceeded to be friendly and entertaining. They were charming hosts yet discreet when it came to approaching us too closely.

They sought our admiration now, for our attention was being diverted from them by a family of cormorants silhouetted against the sky as they sat like bronze statues on the high white rocks at one end of the island.

A fresh breeze across the water magnified the potent scene that had greeted us upon our arrival and had accompanied us during our visit. It revived the guano question, and, in logical sequence, it brought up the question of the depletion of the fish in the sea, which are being consumed daily by these myriads of feathered clowns. Which was the more valuable, the fish or the guano?

Much in the fashion of a royal flunkey announcing the King, the Dutch caretaker of the island announced, "This is guano!" With a little trowel-like spade he turned up a bit of brownish clay over which we had been walking. This solid mass of clayey substance covers a large portion of the island. Once a year it is loosened with a spade and raked into heaps to be bagged and carried away to be marketed.

The day was advancing as we chugged away from Marcus Island. As we looked back on its unique inhabitants in their black and white habiliments, they salted and peppered the terrain like a Scotch tweed. We watched the island dwindle into a mere speck in the South Atlantic but we knew that jackass penguins would go on living, braying, mating and dying unconscious of the fascinating experience they had furnished two inquisitive Americans.



FROM MID-FEBRUARY TO EASTER SUCH A SHOW MAY GRACE THE WINDOW GARDEN

By bringing a few pots at a time to heat and light you may have a succession of bloom. The pots are shown here in the galvanized tray and on the folding table described by the author

Your Winter Window Garden

Some advice on forcing bulbs for off-season bloom

By ADOLPH KRUHM

FOR eight months of the year we work and live among our flowers and plants in the garden. To be deprived of their companionship during the winter months would take a great deal of joy out of life. One way out would be a standing order at the florist's. Few budgets permit that. At any rate, this course would not provide half the pleasure it gives us to grow our own flowers.

After watchful waiting and loving tending, what a kick we get out of the results scored in cooperation with Nature. We would never want to miss all this excitement and, besides, the raising of flowers is, to us, almost as important as food.

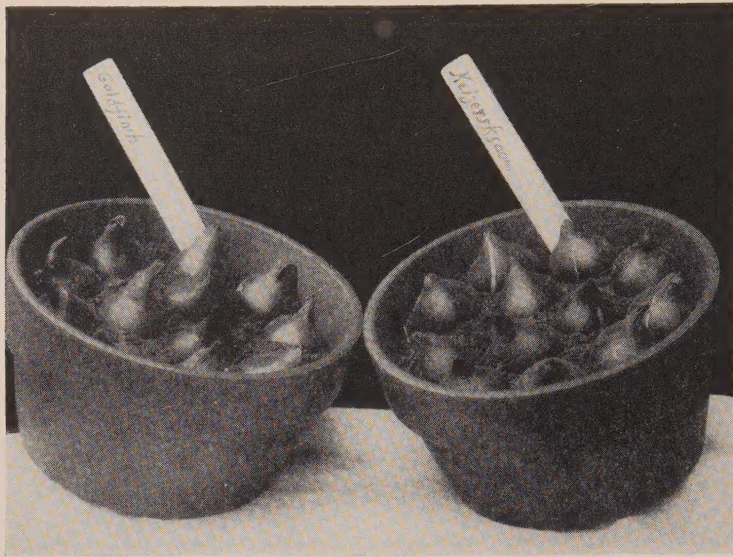
The problem of having winter flowers aplenty and at least expense was solved with the help of the so-called Dutch bulbs. Hyacinths, tulips and daffodils are a god-send to the gardener with limited budget, provided he is willing to do a little work right now.

Comes the day when the bulbs arrive early in October. The weekend nearest the middle of that month sees planting started. But we generally do not wind up with bulb planting until some time during November. As a matter of fact, planting a few pots at a time will cause them to come into bloom in the same chronological succession in which they were planted, and give a continuous show.

There is some preliminary work that should be done at an earlier time, when materials are assembled. Bulb pans have to be scrubbed clean, to dispose of possible hang-overs of fungi and insects. Suitable soil mixture is prepared. We find that good garden soil, sand and peat moss in equal proportions provide a well-balanced growing medium for all bulbs. Adding two or three pounds of bone meal to every bushel of such a mixture tends to increase the size of the flowers and their lasting qualities.

We confine ourselves almost entirely to six- and eight-inch bulb pans. These differ from ordinary flower pots in being shallower. The six-inch size holds either four hyacinths, five daffodils or six tulips. Eight-inch pans accommodate just twice that number of bulbs in each class. And right here a warning—don't mix varieties in the same pan! They are bound to bloom irregularly and never present a satisfactory picture. Beside the pots and soil we provide wooden labels on which we record variety names and planting dates.

Several pieces of broken pots are placed over the hole in the bottom of each pan to insure proper drainage. Each pan is filled about half full of soil, bulbs are placed at regular intervals and the pots are filled with soil up to the rim. Stored outdoors, these flower nurseries must be cool



A DOZEN BULBS TO A PAN ARE ABOUT RIGHT

After placing and covering the bulbs, the pots should be buried under four inches of protective soil or peat moss

and moist and in darkness during the process of making roots.

We place all the pans in a coldframe, crowding them as tightly as their shape permits. They are plunged in peat moss, which fills all the spaces between them. Then comes the time for an operation second only in importance to the actual planting. The pans are given a thorough soaking! When they and the surrounding peat moss (or soil) have absorbed all the water they will hold, the tops are completely covered with several inches more of soil or peat moss—and forgotten! Where no coldframe is available for this purpose, a trench dug in any out-of-the-way part of the garden serves just as well.

Now Nature's miracle starts. While the weather is getting colder and colder, the roots of the bulbs, buried snugly in a warm bed, begin to develop and spread. Bulbs planted the middle of October will have developed a root system by mid-December. Roots will push through the holes in the bottom of the pans, and it is then time to bring them indoors, preferably into a dark corner of a cool cellar. Set the pans on peat moss, which will absorb and hold moisture. This time, however, the tops are not covered, and the brown or green tips of the now well-formed young plants are left to drink in a little light.

From two to three weeks in this situation will encourage the urge to bloom to a point where the buds can be felt in the surrounding foliage. It is easy to judge with tulips, their buds being just little bumps in an otherwise straight sprout. With hyacinths the buds will begin to show when they have pierced the neck of the bulb. Then, and not until then, should the pots and pans be brought to full light and the comfortable atmosphere of the

living room where they are to give us joy.

While this transformation of dormant bulbs into living, flowering plants is going on, some thought should be given to the place they are to occupy while coming to mature beauty. Ours is an old-fashioned house with hot air heat—the worst imaginable for growing plants, especially those of the fleshy-leaved types developed from bulbs. The space occupied by our annual crop of midwinter flowers is a large bay window with a northern exposure. Into this we fitted a roughly-constructed folding table in two sections. Each measures two feet deep by five feet long, with

the edges on one side resting on the window sills.

For the top of this table we provided trays of heavy galvanized iron, with rims two inches high. Several coats of paint made these trays watertight. We then covered the bottoms with an inch of a mixture of coarse gravel and sand to insure drainage. None of the plants we grow in this window garden like to have their feet wet. Although watered thoroughly every other day, evaporation due to the hot air heat nicely controls the surplus supply of water.

Beginning the middle of January we start to bring into the warmth and light of our living room the pots stored in the cellar. By this time some of them are literally bursting to show what flowers they hold. This is especially true of the daffodils. King Alfred, the most satisfactory variety of many we have tried, if given half a chance, will per-



READY TO BE BROUGHT INTO THE CELLAR

By December 20 the bulbs should have reached this stage, and the flowers may already be felt within the pips of the plants

form with time-table precision. As a matter of fact, all the varieties of all bulbs suggested by dealers as suitable for "forcing" will deliver flowers on schedule time. We always look for the first King Alfreds within 120 days from the date the bulbs were planted.

Now another of Nature's marvels reveals itself in our winter window garden. Fundamentally it matters little when you plant your bulbs. Those planted in November will bloom just as surely as those planted earlier. While the balance of favor is with those having the best root system, the final determining factor is the length of daylight the plants get after being brought into the window garden.

As the days grow longer after the middle of February, the time to bring the plants into bloom grows shorter. Tulips, especially, afford a striking illustration of this. Those brought into the window early in February would take all of four weeks to burst into bloom. After the middle of February the plants seem to be in more of a rush. By the first of March some of the early tulips, as well as daffodils, are ready to accommodate the skilled florists by producing flowers within two to three weeks from the time they are brought near heat, depending largely on the amount of light that the pots get.

As already intimated, there are, among the various classes of bulbous flowers, certain varieties that are better adapted to indoor culture than others. This applies least to hyacinths, all of which seem to be equally contented whether grown indoors or out. But among daffodils and tulips we find some stubborn fellows who resent being coaxed to bloom out of their regular season.

Among the tulips there are two classes that you can count on to bloom on time indoors—the early-flowering varieties in both single and double form, and the Triumph tulips. Of course there are some breeder, Cottage and Darwin tulips that may be forced to bloom before their outdoor May inclinations. But it calls for expert care and lots of experience to get them to bloom indoors, so you'd better temper ambition in that direction.

If you were to ask us which among scores of single or



THIS IS KING OF THE BLUE

By the middle of February the first pots of the early hyacinths are ready to perform in this fashion

double early tulips have given the greatest satisfaction, we would name: Single early Pink Beauty; orange De Wet; old rose Hobbema; scarlet Duc Van Dol, and red and yellow Keizerskroon. The last named is not only one of the oldest varieties, but also one of the most reliable. It has been described as the barometer of Dutch bulb values, so stable is its price. Grown by the acre in Holland, it represents so many Dutch guilders per square foot when offered in the world's markets.

Among a dozen double early tulips we think most highly of Murillo. Its flowers are a delicate rose-pink color, touched

with white. There are taller varieties than Murillo with its twelve-inch stems, but there are none that bloom in more satisfactory fashion.

The Triumph tulips are a comparatively new race. They descend from single early and May-flowering varieties. Inheriting the "forcing" characteristics of the early, and the large-flowering qualities of the Darwins, they follow the early varieties in season of bloom. Their beautiful color combinations remind us of the choicer breeder tulips. It is hard to select, from a dozen equally desirable varieties, those that are bound to please. But if limited to three, we would vote for Aviator, a glossy red with silvery edge; President von Hindenburg, a garnet red with yellow border; Telescopium, which bears reddish-violet flowers on tall, strong stems.

We have already referred to the daffodil King Alfred as one of the most satisfactory trumpet varieties for indoor culture. This is a golden yellow variety. Our second choice is Glory of Sassenheim, which has a creamy white perianth with bright, canary yellow trumpet. Among the Barrii, Lady Diana Manners brings a combination of white perianth and yellow cup with deep red, fluted edge. Incomparabilis Bernardino has a creamy white perianth with a heavily frilled orange-apricot cup.

From these suggestions the garden lover should gain some idea as to what may be accomplished by way of stealing a march on the springtime. World conditions this year will result in a large supply of bulbs from Holland that otherwise would be absorbed by the British market.



MONTEREY CYPRESS



AN OLD TIMER

TREE SKETCHING AS A HOBBY

By CHARLES D. UTT

Sketches by the Author

FOR years I have enjoyed walking in the woods, but only recently have I discovered the fun of carrying a sketch pad and a pocketful of pencils with me. Sketching has opened my eyes to a hundred shapes and colors that I had been missing. I had been aware simply that trees were all about; but now, since they have posed to let me sketch them, many of them are not only in-

dividuals but friends with the charm of personality.

Browning has Fra Lippo Lippi say:

"We're made so that we love

First when we see them painted, things we have passed

Perhaps a hundred times nor cared to see;

And so they are better, painted—better for us,

Which is the same thing."

I have found that so far as trees are concerned one learns to see and love them better as he draws or paints them himself; and one should not become discouraged if his first attempts are not so successful as he would like. Drawing is in large measure seeing; and after a little deliberate observation and practice, one's eye and hand learn to work together.

Naturally one is inclined to sketch the trees of unusual growth, but the normal tree, perfect in its symmetry, is also an inspira-

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JEFFREY PINE

When Nature Goes to Sea

Birds, fishes and stars give names to U. S. Navy

By MAUD MACDONALD HUTCHESON



THE PELICAN AND ITS NAMESAKE, A NAVY MINE-SWEEPER

According to the practice followed by the United States Navy, all mine-sweepers take their names from birds. Among others selected are the kingfisher, robin, raven and osprey

FISHES and aquatic mammals of the waters, birds of the air, and the stars in the heavens, all have their appointed place in the United States Navy's "christening code".

Although vessels of at least a dozen different types make up the complete clan, every individual member in the Navy's family is named according to an established set of rules. Under these the names of fishes are assigned to submarines, mine-sweepers are called after birds, and cargo boats go about their business under the authority of stars and constellations.

The *Sculpin*, which shared the headlines at the time of the *Squalus* tragedy, has a name unfamiliar to the average ear. It is a rough, shiny, big-headed sea fish. The *Sea Raven*, as the sister-ship to the *Squalus* has been named, is also named after a type of sculpin.

A list of new vessels made public by the Navy in July, 1939, provided for a number of submarines, bearing names of fishes or other denizens of the deep, some well-known, others obscure. *Mackerel*, of course, needs no explanation, but *Grampus* certainly may be looked up. This is a voracious toothed whale (this time a mammal), fre-

quently styled "the killer" because of its ferocity in attack. It is a denizen of the northern oceans, preying on seals, porpoises and the smaller cetaceans.

Furnishing a happy contrast there is the *Gudgeon*, a little fish, rarely exceeding eight inches, who likes to play about in sandy shallows.

Another of the new under-sea craft will be launched as the *Grayling*, related to the salmon family, which has the deserved reputation of being a "handsome" fish! It is a favorite of the angler and popular as a dinner course. One species, the Michigan grayling, is now extinct. The *Grayback*, the *Marlin*, and the *Gar*, also figure in the new submarine quota.

The rule governing mine-sweepers is that they be given the names of birds. The *Kingfisher*, the *Robin*, the *Pelican*, the *Raven* and the *Osprey*, are found in this category.

Cargo boats—perhaps to compensate for their less venturesome way of living—take their names from the stars and the heavenly bodies. This class contains the *Sirius*, which we know as the Dog-Star; the *Regulus*, described as "a bright star in Leo", and the *Capella*, which astronomers define as a "bright star of first magnitude on the left



SUBMARINES ARE GIVEN THE NAMES OF FISHES

Ships that travel under the surface when they choose are thus appropriately named, as in the case of the submarine *Sculpin*, shown here

shoulder of Auriga". Sailors must learn to know the stars.

A place in Greek and Roman mythology has been assigned to such commonplace craft as repair ships. One now under construction is being called the *Vulcan*, after the Roman God of Fire, and the Navy already has a *Prometheus*. He was the audacious Greek youth, we remember, who stole fire from the hearth of Zeus and brought it to earth. Another member of this family operates as *Medusa*—the lady who had serpents in her hair!

Thus Nature has a quota of her own among the lesser ships that go down to the sea.

When it comes to battleships, the highest-ranking members of the Navy's enormous family, they must be named for States. The keel for the 35,000 ton *South Dakota*, for instance, was laid at Camden, New Jersey, on July 5 last.

Cities, large and small, receive their share of recognition from cruisers and gunboats, and personal tribute is paid by destroyers to men whose service to their country has been outstanding.

The Navy List issued in July provided for the building of the *U. S. S. Swanson*, in honor of the late Claude A. Swanson, Secretary of the Navy from 1933 to 1939. Another is being named the *Edison*, after the famous inventor, whose son, Charles Edison, is now Acting Secretary of the Navy.

Several members of a family may be honored in a destroyer's name, as in the case of the *O'Brien*. Captain Jeremiah O'Brien and four of his brothers showed conspicuous gallantry during the first naval engagement of the Revolution. The *Porter* is for Commodore David Porter, the father, and Admiral David Dixon Porter, his equally famous son.

These greyhounds of the sea are all memorials to men with a noble record of service in the Navy or some related sphere of public life. There have been destroyers named for enlisted men who have performed deeds of great valor, and Robert Fulton, father of the steamship, is among those

on the Navy's honor list for his contribution to sea travel.

To aircraft carriers goes the task of handing on the tradition of famous battles, and the ships that fought them in days gone by. The *Lexington*, the *Yorktown*, and the *Saratoga* were christened for the engagements that changed the course of history. In the *Ranger*, John Paul Jones's clipper is immortalized, and in the *Enterprise* another famous ship lives on.

Oil tankers are assigned the melodious Indian names of rivers in those sections of the country where oil is found. Fleet tugs take the names of Indian tribes and harbor tugs the names of Indian chiefs. *Pyro* and *Nitro* are the Navy's ammunition ships, names for these explosives.

Hospital ships carry on their good work under such synonyms for kindness and compassion as *Mercy* and *Relief*. There is a story (probably fictitious) of the wag who had been treated on both these ships, and declared there was "no relief on the *Mercy*, and no mercy on the *Relief*!"

In the Navy's ship-calling code the actual christening ceremony has a place of first importance. The champagne bottle must be broken against the new hull by a lady, and in the case of destroyers this brings in family tradition. These long gray monsters are christened by the nearest female descendant of the man in whose honor the vessel is named. The Navy has an expert genealogist in charge of this task—Mrs. Edna B. Casbarian—whose researches sometimes take her through the records of four or more generations before a chart is finished. They are works of art and accuracy, compiled from such sources as the voluminous personnel files of the Navy, the Naval Library, the Library of Congress and the extensive genealogical records of the Daughters of the American Revolution. Even then, the final choice may be someone with only a collateral claim to relationship, and in cases where no descendant can be traced the Secretary of the Navy has the right to name a sponsor.

Afraid to Go Home in the Dark

By STEPHEN HAWEIS

Illustrated by R. Bruce Horsfall

WITH a house of open doors and windows, and with wide verandas on which three meals a day are served, birds well know the difference between the comfort and luxury of such premises (we call them the Sylvania Bird Club) and the arduous business of hunting food in the great world outside. Humming birds are not club members. They are not interested in seeds or plums, sugar or crumbs, or even butter or bacon scraps. Yet sometimes they do come, usually to the cut flowers in vases. And I have seen one visit every picture in the room as though giving each a thorough and appreciative criticism. They show no fear, and have no interest in etchings or engravings—well, we all have our limitations.

In that house we are accustomed to see birds on the backs of chairs, or industriously picking a hole in an orange in the silver bowl on the sideboard. At any moment one may flit past your head, and once two birds, having an aerial argument about the economic situation, third term or something, shot between my nose and the book I was reading in the swing chair. They seem to know I am harmless. Or, it may be that, possessing a finer sense than human beings can comprehend, they recognize in me a singularly pure and noble spirit. I incline to this belief myself, of course, but I admit that I have not found anybody who shares it.

The other day a curious thing occurred when a big humming bird, attracted by the bright shade of an early lamp, flew in and could not find its way out again. It dashed to and fro in every direction but the right ones. The dusk was gathering rapidly, as it does in Dominica, and seemed, when the mantel lamp gained courage, far darker than it really was. The bird would have none of the open door or window, but bounced against the ceiling like a hawk moth, until, at last, it slid down the wall and came to an astonished rest on the bookshelf—on the *Outline of History*, to be particular. Out of breath, but by no means exhausted or terrified, the black velvet morsel, with wide crimson breast and epaulettes of electric green, crouched down, its little toes

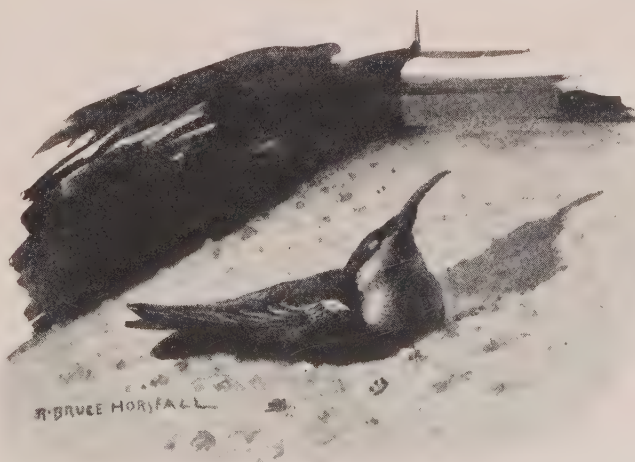


"... WHEN HE EXTENDED THE FINGER THE HUMMING BIRD SUDDENLY ACCEPTED IT AS THE BEST SUBSTITUTE FOR A PERCH IN SIGHT."

gripping the smooth surface, and probably longed for a twig. Some people think that humming birds never settle and that they fly forever, like the legless martlet of mediæval heraldry, but our humming birds sit a great deal among the bushes. The visitor did not fear the approach of a giant, nearly seventy inches high, and when this monster extended a finger the humming bird suddenly accepted it as the best substitute for a perch in sight.

"Fee Fi Fo Fum," remarked the giant, or words to that effect, and proceeded to stroke the tired back of the little bird, which closed its eyes contentedly. Was it so paralyzed by exhaustion? No, for at any unusual sound or movement it sat up at once, wide awake, its little black eyes, like the black glass heads of pins, shining in the lamp light. Then it settled down to enjoy the caress again. After a bit the giant took the bird outside into the darkness, but

at once the little toes gripped the finger more tightly. He waved his finger to dislodge the guest, but it refused to be waved off into outer darkness, holding fast to what it knew was good—or good enough. So the giant had to bring it back again. The lights gave the bird courage to fly again, and once more it careened and caromed around the ceiling, until, for the second time, it found a refuge upon that friendly but colossal



"THERE IT LAY, FAST ASLEEP, LIKE A DARK, JEWELLED STAR UPON A FIELD OF SNOW."

finger. It sat on it and yawned. It flourished its long thin tongue and snapped its long curved beak.

"Dinner is served, sir," said the black maid.

Yes, but you cannot eat dinner with a humming bird clamped to your forefinger. So the giant went out a second time into the garden, and far from the house. He went to the acolyfa bushes where a tired bird could sleep and be safe, but still it refused to leave its perch. Next, the giant attempted to unpick one wee claw from his finger and attach it to a twig, but the bird only clung harder than ever. It was afraid to fly in the dark! Perhaps no humming bird will risk itself in the air when it cannot see where it is going. Night flying is for owls—and giants. And so, afraid to scrape the tiny creature off into the bushes, which by now he could hardly see himself, the giant was obliged to carry it back, riding on two forefingers as the Roman charioteer rides two horses in the circus.

"The soup is getting cold," hinted the giantess.

"Er, what?"

"I said the soup is getting cold."

"Well, would you mind holding my humming bird while I take a little nourishment? This business is be-

ginning to get me down; its toes are as sticky as fly paper. It won't come off. I am tanglefoot for humming birds."

Suddenly the bird flew up again, and the family had supper. Yet it was perfectly obvious that the bird had never done any night flying and refused to try. So what can you do with a guest who won't go away at bedtime. Offer him the spare bedroom, of course. That is what we were obliged to do. In fact, it was the giantess who had the bright idea. The best guest room leads out of the drawing room. It contains a huge carved-mahogany bed with four posts, frills of dotted muslin and a tufted quilt.

"I should think," she said, "that you could rub him off on the soft tufts without hurting him, and he can sleep on the bed. And then open the windows."

So the giant dabbed the long curved beak upon the counterpane and gently unhitched the claws of the bird. It lay still with its wings widespread and closed its eyes. Two hours later we went to look at it. There it lay, fast asleep, like a dark, jewelled star upon a field of snow. We said good night and tiptoed to the door.

We claim that this was the first humming bird ever to sleep all night in a four-post bed. It was not there in the morning, but, clearly enough, the bed had been slept on.



Breadfruit Tree Stamps

By EDITH M. LAING



THE breadfruit tree, *Artocarpus* (from *artos* bread, and *carpos* fruit), is always associated in our minds with the South Sea Islands. But this remarkable tree (*Artocarpus indica* is the most important) is a native of the Malay Archipelago, Indonesia. Centuries ago each wave of people, forced eastward by invasion or over-population, carried in their canoes carefully wrapped shoots of this indispensable tree. These they planted as they migrated from island to island in the vast Pacific. The people would have fared poorly without it. They obtained food from the fruit; the tree's inner bark was pounded to make cloth; the wood was shaped by stone adze and shell chisel into canoes and furniture; and the canoes were caulked with coconut husk mixed with the gluey substance that exuded from the breadfruit stem.

These handsome, evergreen, symmetrical trees grow only in a hot moist climate, and attain a height of about fifty feet. There are several varieties, among which the two- to three-foot leaves vary in shape from entire to deeply incised; in color from glossy green to metallic crimson and purple, making the trees particularly striking.

The male flowers grow in spikes, and the female ones in dense heads. The globular, melon-shaped fruit, which is one of the important staple foods of the world, grows in the axils of the leaves. This fruit, which must be picked before ripe, is prepared in various ways. It may be baked whole in earth ovens or embers, scooped out, and eaten like mashed potatoes; it may be sliced thin, dried, and ground up to make into bread and puddings. It is also preserved by fermenting in pits, and many islands cultivate several varieties that ripen at different times and so provide a constant supply of fresh fruit.

No tree can boast association with a more thrilling real adventure story, for it was to secure a cargo of young breadfruit trees for transportation to the West Indies that the famous *H.M.S. Bounty* made its eventful voyage to the South Seas. Although the plants then sought for never reached their destination, another shipment reached there at a later date.

The Tonga Islands, which picture the breadfruit tree and its fruit on two of its stamps, are a British Protectorate situated south of Samoa, in the romantic South Sea region.

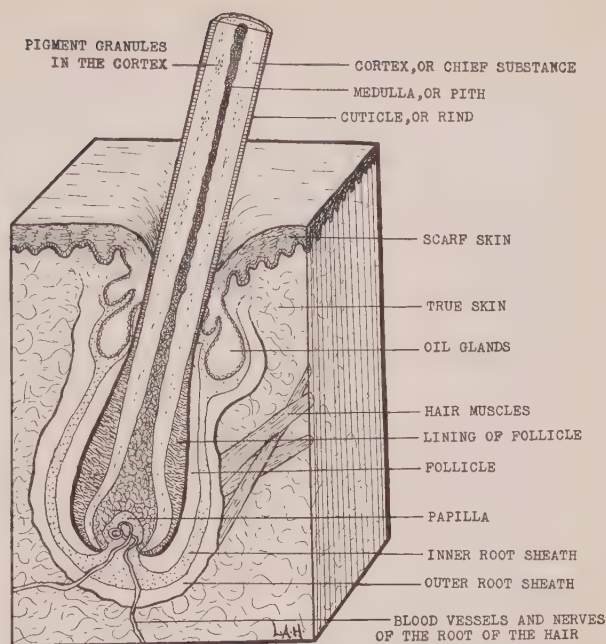
FURS UNDER THE MICROSCOPE

By LEON AUGUSTUS HAUSMAN

TO OWNERS of microscopes, the hairs of mammals offer a fascinating field of study, so varied are their forms, and so intricately related are the various structures that make up each single hair. True hairs are found only among the mammals; even those smooth-skinned, fish-like mammals, the whales and porpoises, show traces of hairs about the muzzle. In other forms, such as porcupines, hedgehogs, and spiny anteaters, the hairs are developed into heavy bristles or spines. With such mammals as sheep, goats, camels, llamas, seals, otters, beavers, and rabbits, the thick hairy covering offers to man fibres for textiles, or furs for garments. It is the hairs of fur mammals that concern us here.

A hair, or hair-shaft, as it is called, is a product of the outer layer of the skin—the epidermis, or scarf-skin. (The plates and scales of armadillos and pangolins are derived, like the feathers of birds, from a deeper layer.) This, bending downward into a pit-like depression in the true skin, or dermis, beneath, then turns and rises up and out of the pit-like depression, and emerges above the skin-level as a hair-shaft. The depression is known as the follicle. The hair-shaft, after it rises out of the follicle, is a dead, dried structure, like a finger-nail. It lives and grows only at its base in the bottom of the follicle, where it can be seen reaching around and clasping a tiny pulpy knob called the papilla. From this papilla the growing cells at the base of the hair receive their nourishment and energy for the work they have to do.

As the hair-cells multiply and push upwards, forming the hair, they change their character. Some remain aligned in the center of the hair-shaft as a sort of pith, called the medulla; others, closely massed about this central pith, become fused together and form the nearly transparent cortex, or chief substance of the hair-shaft. The outermost cells form scales, overlapping like the shingles

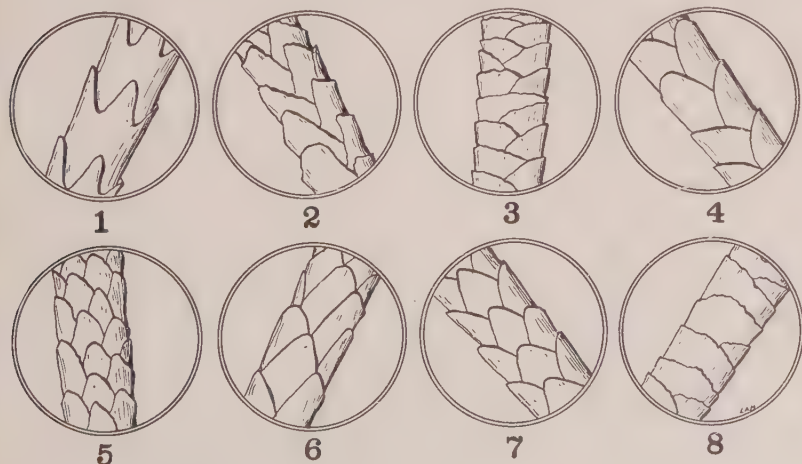


HOW A HAIR GROWS FROM THE SKIN

A tiny block of skin containing the base of a hair-shaft, highly magnified to show the structures associated with the hair, and how the hair-shaft is produced. Note how the scarf-skin bends down into the pit, or follicle, and then rises out of it, transformed into the hair-shaft.

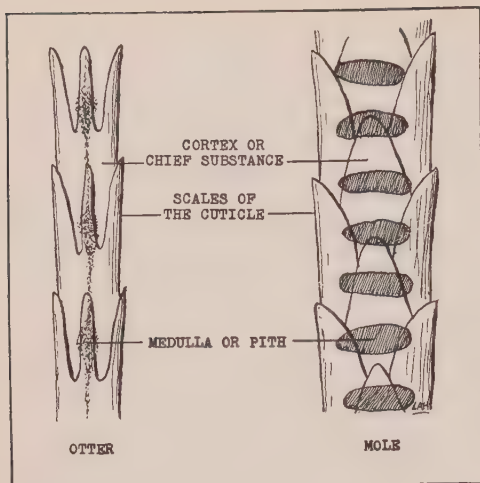
on a roof, with their free edges pointing toward the tip of the hair. These scales, forming a sort of protective rind, or cuticle, are called the cuticular scales. As the hair-shaft grows upward and outward, certain cells at its base are continually manufacturing coloring matter for it. This coloring matter is carried along as the hair grows, either in the pith or in the cortex, or in both together. It may be in the form of a clear and generally-diffused stain, or in the form of very minute bodies called pigment granules. For our purpose the pigment granules of the cortex will be the only ones considered. Leaving out of notice several other smaller structural parts of a hair, we have as its chief components the pith or medulla; cortex or chief substance; rind or cuticle, composed of scales; and the pigments or coloring substances, present as granules or diffused stain.

If we now examine under the microscope the hair-shafts from a large number of species of fur-bearing mammals, we shall soon see that these hairs differ markedly in diameter; in the shape, size, and arrangement of their cuticular scales; in the character of the medulla or pith, and in the shape, size,



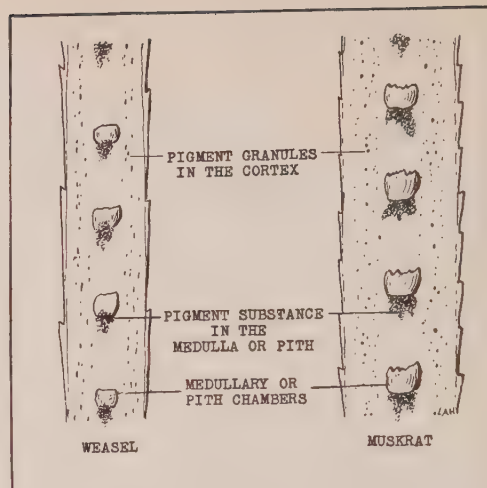
FORMS OF THE CUTICLE SCALES OF HAIRS OF VARIOUS FUR-BEARERS

These hair-shafts are treated to show the outermost scales. Where the scales are similar, as in the skunk and the mole, the medullas or piths are usually dissimilar. The parts of the hair-shafts shown at the left are highly magnified but not drawn to scale. They are, in the order numbered, ermine, rabbit, gray squirrel, muskrat, skunk, raccoon, American mole and opossum



At left the most and least durable fur hairs, the former consisting largely of cortex element and the latter of partly empty pith chambers

Coloring matter in a hair-shaft aids identification. The weasel and muskrat hairs differ in the forms of the pigment granules



and grouping of the pigment granules in the cortex or chief substance. Sometimes we encounter hairs that contain no medulla or pigment granules; sometimes the pigment is present only as a general, clear stain; again it may be in the form of granules of regular shape, or as irregular masses. Sometimes any or all of these conditions of pigment substances may be found in the medulla, or in the cortex, or in both together. The cuticle or rind of a hair does not naturally bear granules or stain. When, therefore, we see under the higher powers of a microscope a hair-shaft with a stained cuticle, we may quite safely conclude that it was colored by some external agency.

It is possible, therefore, to determine a good deal concerning furs from a microscopic study of their individual hair-shafts. Thus, if muskrat, or rabbit, or nutria, or woodchuck furs are treated and dyed, they can be identified, for the characteristic microscopic structures of the hair-shafts remain. Other, minuter structures than those previously mentioned may be aids in identification of hair-shafts, such as, for example, the forms and degrees of compaction of the individual cells of the cortex; or the slender, very minute air-vesicles (called fusi) which lie among these cells.

In order that the various structural parts of a hair-shaft may be studied under the microscope, it is necessary to utilize various reagents, such as clearing fluids to render the hair-shaft as transparent as possible (for the study of the medulla, cortex, and pigment granules and fusi); or fluids for rendering the hair opaque (for the study of the scales); or decolorizing fluids (for removing a too-heavy dye, or for reducing the natural pigments of the hair). Light of differ-

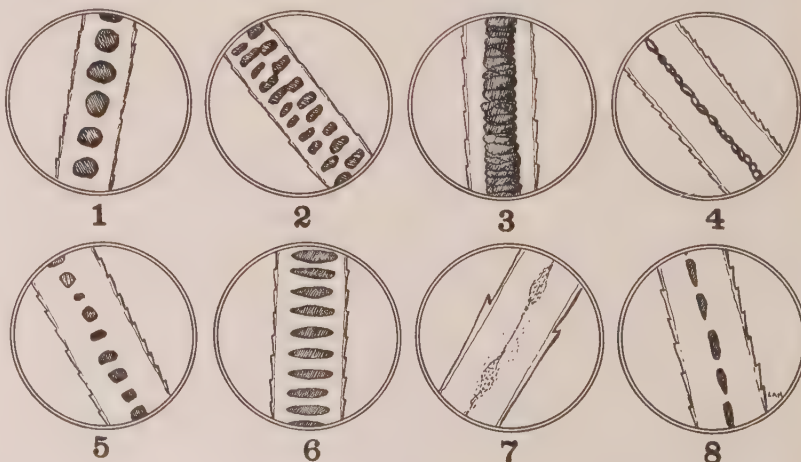
ent colors, and intensities, and striking upon or through the hair-shaft at different angles, must be employed to bring out elusive structures that lie just on the borderline of clear vision. The finer structural parts of the finer hair-shafts are often excessively minute, and are measured in units called microns. One micron is equal to one one-thousandth part of a millimeter, and a millimeter is roughly equal to the horizontal diameter of a letter "o" in the type in which this article is printed.

In studying in a comparative way the hairs of different species of mammals it must be borne in mind that the same regions of the various hair-shafts be used, for the characters of all the microscopic structures we have been talking of change greatly from the base to the tip of each hair-shaft. Moreover, we must be sure that the hairs we are examining came from the same regions of the body. Still further, we must make sure that we are dealing with same kinds of hair, for in many mammals we find two "layers" of hair: a soft, dense, "under-hair," and a longer, coarser, "over-hair". Lastly, the hairs under examination must have had the same microscopic treatment; and be examined with the same degree of magnification, and with light of the same color, intensity, and angle. These are the only safe bases for comparisons.

Turning now from the identification of furs to the question of their wearing quality, the peerer through the microscope will notice that those furs that are the most durable are those whose hair-shafts contain the smallest

FORMS OF THE MEDULLAS OR PITHS OF THE HAIRS OF VARIOUS FUR-BEARERS

Notice the varying forms of the chambers of the medulla or pith. The character of the medulla alters considerably as one examines the hair-shafts from their bases to their tips. These drawings are highly magnified and not drawn to scale. In the order numbered they are: chinchilla, domestic mouse (with compound pith), lynx, nutria, skunk, American mole, otter and raccoon



amount of loose pith or medulla. If we take the fur of the otter as a standard durable fur, and call it 100, the relative durability of some of the common furs is, comparatively, as follows: wolverene 100; raccoon (natural)

65; raccoon (dyed) 50; beaver 90; true fur-seal 80; skunk 70; mink 70; muskrat 45; opossum 35; fox (natural) 40; fox (dyed) 25; ermine 25; nutria or coypu rat 25; lynx 25; chinchilla 15; goat 15; rabbit and hare 5; mole 5.

Autumn's Farewell

By REBEKAH T. FLEISCHMANN

I do not know why winds do blow,
Or why the chill rains fall;
Why autumn gold beneath the mold
Lies buried beyond call.

I cannot say why asters gay
Lie pinched and sere and brown;
Or why the red the oak's heart bled
Lies wasted on the ground.

I will not weep when ruin heaps
Unnumbered garden paths
With bronze and gold, gay largess sold
Into the keen frost's grasp.

Though frost has claimed the hillside's flame,
I shall not wonder why;
For He Who taught the autumn's art
Has bade the autumn die.



PYMATUNING MUSEUM, OUTSIDE AND INSIDE



PHOTOGRAPHS BY W. G. CONKLIN

The museum is dedicated to all interested in Nature and is conducted as an adjunct to the bird refuge. The exhibition room contains specimens collected from the immediate vicinity

Pymatuning Museum

By N. R. CASILLO

PYMATUNING MUSEUM, on the newly created Pymatuning Reservoir in western Pennsylvania, is distinctive because it is located in the heart of the region from which its specimens were collected. At its dedication last fall, one could glance through the windows of the display room, containing some two-hundred specimens of waterfowl and birds associated with water, and actually see groups of ducks, totaling many thousands, resting on the waters of the upper reservoir.

The beautifully-mounted specimens not only include the summer and permanent waterfowl residents of the section, but also the migratory, chance, or occasional visitors that the general public would not ordinarily see.

The eighty-eight-foot building of rustic design occupies the highest point on 103-acre Ford Island. The fifty-by-twenty-foot exhibition room provides ample space and facilities for the throngs that regularly visit the place, as well as for the more serious students and Nature lovers.

Incidentally, since its completion, only five years ago, the 3670-acre refuge in which the museum is located has

become a favorite resort for waterfowl and other birds. Nearly 300 species have been observed in the refuge. During the past year or so, American and snowy egrets have been seen. In May, 1938, an extraordinary visitor was a great white heron, a species not supposed to range farther north than Dismal Swamp, in Virginia, and North Carolina. Occasionally duck hawks pass through the area. In April, 1938, the keeper observed one overtake and kill a female scaup duck in full flight.

The Pennsylvania Game Commission is conducting an intensive program of planting foods most attractive to all types of birds, since adequate food and protection play the leading roles in the conservation of our bird life under today's complicated conditions.

People throughout this region appreciate the conservational and educational advantages of the refuge, as well as the fact that it is a slice of real wilderness country with its characteristic wild forms, located in the heart of an extremely dense center of population. The museum makes all this even more attractive, valuable and instructive.



PETRIFIED CORALS AND SPONGES

By C. S. GWYNNE

Photograph by Margaret Bonine Fox

HUNT about in the rock of a limestone quarry, or in the crumbling layers of shale along a stream, and you will find the petrified shells and imprints of animals that lived in the seas at the time when the materials that are now limestones and shales were deposited. These shells and imprints of shells have been turned to fossils. Originally they were the shells or skeletal parts of such animals as snails, clams and corals, or the imprints of the hard parts of the animals, dwellers of ancient seas. When they died their shells accumulated in the mud on the sea bottom. For a long while they remained as shells in the mud or sand. Over the coastal plain of the Atlantic states such ancient shells are still to be found in the sediments. These shells are unchanged since the time when they were left by the sea as it withdrew from the land. In other parts of the country, where the sediments were formed in much more ancient seas, the shells were changed to stone, as was the mud in which they were inclosed.

These changes of muddy sediment to rock, and of shell to stone, were made by the underground water that soaked down from the surface of the ground. Falling as rain, the water, as it seeped into the ground, dissolved minerals from the solid matter with which it came in contact. Then it deposited this mineral matter among the particles of sediments and it hardened to rock. The shells also were replaced by mineral matter deposited by the underground water. Similarly the imprints of the shells and other skeletal parts were also preserved.

In many cases the mineral matter of the fossil shells was harder than the surrounding rock. When the rock, during the long ages that followed, slowly crumbled and dissolved, the fossils withstood the weathering better

than the rest of the rock. So, in many places, they came to lie at the surface, in the subsoil, or in streambeds.

The two larger fossils shown here are those of colonies of corals. There are many different kinds of corals living in the seas of today, particularly in clear warm seas of tropical regions. The individual animal is very small, and lives in a small shell formed by secretions from its own body. It secures its food, in tiny particles, from the sea water, which is constantly moving about its mouth. Many corals live in colonies. Some of the colonies have branching forms, like a geranium plant without leaves. Some colonies are rounded masses, something like a large head of cauliflower. Other colonies look something like a wasp's nest. Specimens similar to those in the illustration are to be found in limestone quarries, in the subsoil, or along streams in many parts of the middle West.

The small rounded specimen in the illustration is that of a fossil known as a golf ball sponge. The sponges of the drug store are the soft skeletons of colonies of tiny animals that now live in tropical seas. When the colony is living the pores of the skeleton are lined with the little individual animals. This Iowa specimen was the center of a colony. The pits are the places where rods or braces were attached. Such specimens are not very common. This one came from eastern Iowa.

The small flat fragment in the foreground of the photograph is part of a colony of chain corals. The fluted surface represents the walls connecting the chambers in which the animals lived. The edges of these walls look like the links of a chain, hence the name chain coral. The colonies grow as large as do the other corals. The surface of such a colony looks much like a crumpled chain.



Six helpings of muskmelon for six hungry skunks. With these, as with the contents of dishes, the other fellow's meal always looked particularly inviting. "Big Fella" weighs in on the scales at one pound even. She was the largest of the six. Five of them were females, and "Nig" was the lone brother, named for his lack of a white strip down his face, the only one lacking such marking.

A Skunk Half-Dozen

By MARY DRAKE



Their mother had been caught in a trap set to catch skunks pilfering the bee hives and had been stung to death by the angry bees. So we inherited her family, although not without many doubts on our part, and definite distrust on the part of the orphans. Gingerly we took over our responsibilities, offering first a dish of milk diluted with warm water. All six poked noses into the milk and drank immediately, stepping into the dish in the process. Satisfied, they accepted the box filled with straw and settled down to join our family circle.

After two weeks the skunk menu was expanded to include bread in the milk, and gradually raw meat, vegetables, and cereal; in fact, anything left from the table soon proved acceptable. Nuts were fed the youngsters by using tweezers to protect our fingers, and candy, particularly marshmallows, proved a popular dessert. With such a diet they all survived and became a sleek and



healthy crew. When allowed to run on the lawn they also supplied themselves with insects.

It was only a few days before our sextet lost all fear of us and became even more gentle than kittens. When we wished to carry them from one place to another—as when a dog put in appearance—we would tumble them all into a pail. When they saw in the pail a threat that they were being returned to their box they would climb out as fast as they were put in. However, if one were left out he would climb in, for fear of being left behind.

Each one seemed to have a definite personality and to deserve a name. They were fascinating to watch. When moving about under their own power they travelled in a line as though playing "follow the leader". They used the bottoms of both front feet when washing their faces. They carefully broke up fresh straw in their box to make a comfortable bed. Not wishing to deprive them of their means of protection, we did not remove their scent glands, and we have never had reason to regret this.



When pictured with the flower pots, the sextet had been one week with the Drake family. We also see them travelling characteristically in single file; one of them enjoying a private bit of raw meat, and four of them at their meal dishes. One is investigating the dish of another, an act that always created a problem at mealtime, which was never tranquil.



The Northern Shrike

Photographs by Hugh M. Halliday

About the size of the robin, with large head, sturdy neck and strong and somewhat hawk-shaped bill, the northern shrike, or "butcher bird", is a handsome and bold fellow, but no favorite with lovers of song birds. It nests in the far north, moving south to our northern states in the fall and returning north in early spring. This one was trying to winter near Toronto.

The shrike gets its name as a butcher from the habit of spitting its prey upon thorns or the barbs of a wire fence, or wedging them in the crotches of limbs. Having the relatively weak feet of song birds, the shrike kills its prey with his efficient bill. Since the English sparrow is a favorite food the shrike is often seen within the limits of cities. It kills shrews and small rodents, as well as grasshoppers and other large insects.

With a color scheme of light gray, and black and white wings, with a vermiculated breast and a black mask across the eyes, the shrike blends well with the surroundings. It is frequently seen around farms where the supply of rodents and English sparrows is likely to be large.

The shrike is about to dine on the body of a meadow mouse impaled on the spine of a thorn tree. At the right is a sparrow killed and similarly spitted.





An Intimate Look at the House Fly

How it appears under the microscope, as recorded by C. H. Brown

Some months ago a reader of Nature Magazine sat at his typewriter searching for that elusive "right word". A fly lit on the paper in the machine, and set about a careful job of washing its face and behind its ears. After carefully noting all the trouble to which the fly went to clean up, our friend wrote a clever and humorous little observation. He said that he knew that the fly carried germs and dirt and should be swatted at every opportunity, but that, at least, it was in its favor that it did bathe frequently and efficiently. Another reader, missing the humorous intent of the first writer, took him to task for saying even one good word for the house fly.

It would seem, after many years of public education, that germ-carrying by the house fly should be well known. The slogan "swat the fly" is just as important as ever. On these pages, however, we present eight intimate views of the house fly and his parts. Some of these serve to reemphasize the manner in which the fly, unwittingly, carries contamination from place to place and thus is a source of danger to human health.

Starting at the top and reading down, we first see the fly itself, here magnified by the microscope to nine times its adult size. Next we see a fly's foot magnified



Conservation Education in the Schools

A report of school activities and suggestions as to programs

By E. LAURENCE PALMER

A UNIVERSITY senior whose name had been proposed for Phi Beta Kappa was asked to explain why, when a farmer had once picked all the larger rocks from a hilltop field, it was necessary for him later to repeat this procedure. She replied that, before one could answer the question, it would be necessary to know how long it took a small pebble to grow into a big rock. She was not elected, although she did win a senior oratorical contest.

The average farm boy in an elementary school would be better prepared to answer this question of soil movement than was this university senior. So any attempt to be dogmatic in allocating educational activities to any scholastic level may be dangerous and difficult.

This special insert represents a further treatment of conservation education problems, and is a continuation of the Quarterly Bulletin of the American Nature Association, Vol. 1, No. 3, published one year ago. Copies of this are still available. The earlier bulletin emphasized the service of agencies, other than schools, to conservation education. This insert deals more specifically with school problems. It presents some of the essential findings of a group of workers, who, for three years, have been studying this subject under grants of the American Nature Association to Cornell University. The complete findings are available for use and examination, on a library exchange basis, by responsible persons interested in developing programs for the schools in this field. So far as time and funds permit inquiries for help in planning school programs will be given careful attention.

The reports of the members of the committee making this study have been bound as follows:

A Report on Some of the Private Agencies Contributing to Conservation Education in North America, 336 pages. Claiborne H. Young, 1937.

A Report of the State-supported Agencies, other than Schools, Concerned in the Conservation of Natural Resources, 538 pages. John R. Arnold, 1938.

A Survey of Federal and National Youth Organizations Concerned in Conservation Education, 552 pages. Richard L. Weaver, 1938.

Conservation Education in the Schools and Colleges of the United States. Charles W.

In April, 1938, the American Nature Association began publication of a Quarterly Bulletin as a means of presenting more exhaustive discussions of conservation questions. Many members of the Association, and others, have urged that the material in these Bulletins be given wider circulation through publication as an integral part of Nature Magazine. In recognition of this demand, therefore, the Association announces the substitution of special inserts, of which this is the first, for the Quarterly Bulletin. A limited number of separates of this insert will be printed and made available to members of the American Nature Association, and to others who can aid in furthering conservation education, to which the Association is dedicated.

—Arthur Newton Pack

Quaintance. 500 pages, 1939.

A Study of the Needs of Rural Agencies in Conservation Education. Matt F. Vessel, 1939.

Because many educators have asked for suggestions of types of programs suitable for their schools this present discussion considers existing representative systems of organization. The grade placement recommendations are the results of judgments based on the study of available outlines.

It is impossible here to present details of the situations in the different states. We must be content to comment on the several techniques followed.

Conservation education is sought by legislation in Wisconsin, Florida, Oklahoma and Tennessee. In Wisconsin and Tennessee, this legislation has been accompanied by vigorous activities of the State Conservation Departments, State Departments of Education and teacher-training institutions.

States in which conservation education has been advanced by state-sponsored publications available in generous quantities should include New York State with its *Cornell Rural School Leaflet* from the State College of Agriculture. The Cornell Leaflets that have a particular bearing on conservation as ordinarily interpreted are *Conservation*, January, 1936; *Save the Soil*, March, 1936; *Are They Vermin?*, November, 1937; *Waterways in the Fall*, November, 1938. During the current school year there will be numbers on *Conservation in the Woods in Autumn*, *Conservation in the Fields in Winter*, and *Conservation in the Waterways in Spring*. Use of these bulletins will assist certification of Junior Conservationists by the State College of Agriculture and the State Conservation Department. California has its *Science Guide for Elementary Schools*, sponsored by the State Department of Education and administered through the state teachers colleges. The Science Guide bulletins particularly pertinent to conservation are: *Land Forms*, February, 1937; *Water, Its Conservation and Use*, March, 1937; *Soil, Its Use and Conservation*, September, 1938. Iowa has also made some start in this direction through its State College of Agriculture.

States in which outstanding work is done through existing clubs of young people, work-



ing either under the sponsorship of the 4H clubs, the Future Farmers of America, or under other organizations, would include Michigan, Ohio, Massachusetts, Indiana, West Virginia, Iowa, Wisconsin, Texas and South Carolina. In this category should be mentioned the Missouri Nature Knights, the Louisiana Nature Guardians, the Junior Game Wardens of North Dakota and the Junior Game Patrol of California.

The U. S. Extension Service, through its 4H clubs and adult programs, is in a most advantageous position to sponsor conservation activities. Some states provide conservation projects in all fields, whereas others confine themselves to one phase, such as game propagation or forestry.

Connecticut State College has an excellent club bulletin called *Conservation Through Nature Appreciation—A Handbook for Leaders*. The Illinois club program includes all phases of conservation, and their University of Illinois publication (1938) *Illinois Conservation Activities Manual for 4H Members* is complete and well-illustrated. Those interested in game management should consult the Extension Departments of Iowa, Louisiana, Michigan and Texas. These states employ wildlife club specialists to supervise game propagation projects. Oregon, Michigan and Wisconsin have prepared explicit directions for propagating pheasants. Wyoming has prepared leaflets on all phases of wildlife projects, including a bulletin on fish rearing.

Teachers of the middle-eastern states will be interested in the identification keys published by New Jersey Agricultural College (1937) and prepared by E. L. Scovell. One deals with the native reptiles and the other is a key to the fruits of trees in the state. Iowa's lessons on upland game birds, as well as the outlines for study of animals, will be found helpful.

Wildlife conservation is broadly considered in the North Carolina College of Agriculture club bulletin entitled *Wildlife Conservation Project*.

Ohio's State University club bulletins (1934-37) on Nature, Forestry and Flower Gardening are excellent. Each series is graded, providing four degrees of advancement. A similar scheme of graduated Nature projects is employed in the Massachusetts publications. These leaflets are rich in activity suggestions and methods of organizing projects.

Virginia Agricultural and Mechanical College

has a six-bulletin series on wildlife conservation, which includes many phases of land management as well as game bird propagation. *The Nature Project* by A. B. Brooks, a bulletin issued by the West Virginia State College of Agriculture, will be found valuable.

The *Guide for Wildlife Activities* prepared (1935) by the South Dakota Game and Fish Department for 4H members may also be used to advantage. It can be criticized for its unfair treatment of predatory species, however.

Special teacher-training schools helpful in conservation have been developed in Arizona, New Mexico, Texas, Michigan and Tennessee.

Conservation ideals have been advanced to teachers in service by the use of trailers, either on rails or behind automobiles, in Tennessee, Michigan, Mississippi, California, Massachusetts and Wisconsin.

State outlines in conservation sponsored by some state departments have made constructive development in West Virginia, Iowa, Wisconsin, Tennessee, Georgia and Florida, and there are minor contributions from other states. It should not be implied from the above that these states have made uniformly valuable progress. A worthwhile report on educational progress is

Taking Conservation to the People by The Educational Service, Tennessee Department of Conservation, 1939.

In connection with the preparation of a state bulletin on conservation, Michigan has followed an interesting technique and its Conservation Education Committee has issued, in mimeographed form, a preliminary statement of what the schools are doing in this field in the elementary and secondary schools and in the teacher-training institutions. The committee proposes to base its recommendations on these preliminary findings.

Educational activities along conservation lines that have not yet been well enough developed to warrant analysis would include the sporadic programs sponsored by broadcasting units; unorganized releases of motion picture films; a well-financed attempt, through the New York State Department of Education, to develop phonograph discs of educational value, and special conservation groups with varying motives.

"Conservation education" has been financed by various devices. These include the stamp-selling program of the National Wildlife Federation; membership drives and pressure-group ventures, like

Members of the Conservation Education Survey Committee, which has worked through the cooperation of the Graduate School of Cornell University and the American Nature Association, were:

Dr. E. Laurence Palmer, Cornell University, Director Nature Education, American Nature Association.

In charge of Federal and National Juvenile Organizations, Dr. Richard Weaver, Dartmouth College.

In charge of State Organizations separate from Schools, Dr. John Arnold, Stockton Junior College, California.

In charge of Schools and Colleges, Dr. Charles Quaintance, Teachers College, Johnson City, Tennessee, and Matt Vessel, Cornell University.

In charge of Biological Field Stations, Homer Jack, Cornell University.

In charge of Libraries, Eva L. Gordon, Cornell University



those engaged in by such groups as the Junior Chamber of Commerce; rallies, crow-killing and other contests. These contests are usually ill-advised and scientifically unsound wars on wildlife and of negative educational value. Commercial agencies have sometimes given valuable financial assistance to educational projects, such as the 4H Club conservation camps sponsored by the Federal Cartridge Corporation.

Useful bibliographies have appeared, and a listing of these appears at the conclusion of this discussion.

We cannot here definitely allocate types of behavior to particular grade levels. We have no desire to do so, but, for convenience, we can suggest emphasis at different grade levels. Certainly no one would suggest that first grade children consider seriously the vocational opportunities of becoming a forest ranger, or the diplomatic difficulties involved in legislating about migratory species. On the other hand, one should not expect a high school or college student to adjust himself intelligently to a conservation situation without first going through some of the things proposed for emphasis in earlier school work. So, while tentative grade suggestions are made, they should be considered mainly for their sequence.

First level. Grades 1 and 2, or any other beginner. Exploration. Use of senses. Getting the raw facts. Recognition of major factors.

Second level. Grades 3 and 4. Correlation of experiences, possibly on a competitive basis, but depending on the authority of the learner's senses and intelligence.

Third level. Grades 5 and 6. Evaluation of experiences of others in terms of the learner's own experiences. Questioning every new idea and accepting or rejecting it in terms of past experience. Supplement local experience with information on geographical distribution.

Fourth level. Grades 7 and 8. Adjustment of personal habits in the field to the needs of society. Identifying oneself with this or that group dedicated to improving society and evaluating and understanding these movements.

Fifth level. Grades 9 and 10. Recognizing the place of science and conservation in the world of affairs and developing some worthy interest more intensively.

Sixth level. Grades 11 and 12. Recognition of the vocational opportunities of different fields, either to following them personally, or to understand how they fit into whatever the student's life work may be. Beginning a little self-guidance, and possibly developing a more careful understanding of the technical nature of some field of personal interest.

Some states have suggested that they have ade-

quately handled their school conservation offerings in the "regulation programs" for science and the social sciences. While the committee responsible for this report favors this procedure, they do not know of any state outline at present that adequately develops the conservation idea through the commoner branches of activity. In the succeeding material, occasional reference is made to work being done in states not specifically mentioned heretofore. In these cases the references are to offerings in the established departments.

TYPES OF ORGANIZATION OF CONSERVATION MATERIALS IN SCHOOLS

Conservation is taught at all scholastic levels—in schools

promoting liberal education and in those of a vocational type; in departments of social science as well as in natural science departments. Under these circumstances it is entirely normal to expect a varied organization.

Briefly one may find in the outlines available to the public:

(1) Outlines built around such systematic units as birds, mammals, fishes, trees, soils and water supply.

(2) Outlines of the academic type that deal with the scientific principles

associated with problems of food, shelter, biological balance, successions and life histories.

(3) Outlines of the geographic type in which ecological units are given emphasis.

(4) Outlines of the social science type in which economics, legislation, education and history are emphasized.

There is no need to recommend any one of these systems of organization for adoption by any particular group, but there is ample evidence that those who favor any one system should recognize the merit of the others. The trained biologist, who could write an excellent academic program, might be fully as ignorant of the social significance of conservation problems as would be the sportsman who thought that the cause of conservation could best be effected by training youth to shoot better, or to cast a fly with more deadly accuracy. There is abundant evidence that some of the advocates of these different systems recognize merit in no philosophy other than their own, and are using the dictatorial techniques of the propagandist rather

than the democratic practices of the educator. Unfortunately dynamic and selfish propagandists are to be found not only among professional politicians and office holders, but in the ranks of the schoolmasters, editors, sportsmen and commercial men. It sometimes seems futile to at-

Copies of the issues of the American Nature Association Quarterly Bulletin, now supplanted by magazine inserts, of which this is the first, are still available to members of the Association on request, and to others for a three-cent stamp each to cover mailing costs. The Bulletins are:

Vol. 1, No. 1—A statement of fundamental conservation problems confronting the United States.

Vol. 1, No. 2—A report on the progress of highway zoning and billboard control in California.

Vol. 1, No. 3—A survey of conservation education with reference to existing agencies concerned.

Vol. 2, No. 1—A discussion by Kenneth A. Reid, of the Izaak Walton League, of the national problem of stream pollution.

Vol. 2, No. 2—A report of a survey of roadside control and billboard conditions in New England.



tempt to make suggestions to such people, but hope springs eternal.

This discussion may be considered, then, as a directory to useful published materials for developing satisfactory conservation programs. In the following pages some suggestions are made in the hope that they will be provocative and helpful. References are made to more detailed developments elsewhere. Abbreviations refer to states or publications that, it seems, have adequately developed materials on the subject. The state publications have, for the most part, been mentioned previously here. The abbreviations CSG refers to the *California Science Guide for Elementary Schools*. The abbreviation CRSL refers to the *Cornell Rural School Leaflet*. The abbreviation NMSG refers to *Nature Magazine's Guide to Science Teaching*. NM refers to *Nature Magazine Index*.



Inquiries regarding offerings of different states suggested heretofore should be directed to the State Conservation Department, the State Department of Education or the State College of Agriculture.

Programs Organized on the Basis of Systematic Units

Probably the oldest practice of organizing materials in this field calls for the allocation of emphasis on particular systematic groups. In some ways, this system is the easiest to put into practice but it has certain limitations that are serious. It is not always functional. For example, one might study frogs without developing any particularly useful change in the student to influence his behavior in using frogs wisely. A certain normal school biology teacher once taught a lesson on fish by using undersized trout that he captured in a net out of season, in a posted area, and that he held captive without a license to do so. He may have

taught a good lesson on trout, but not a good one on conservation. One state science outline recommends that biology teachers study, in an aquarium, a game fish that cannot be held captive without a particular license.

On the other hand, courses have been developed in which generalizations regarding practices are presented with no opportunity for the student to have experiences with the basic science. Pupils are taught to do this, or not to do that—to kill mouse-eating hawks or protect apple-tree-eating rabbits—but the reasons for these attitudes are not based on the authority of original experience. This of course is undesirable.

As an example of a sequence dealing with a particular group of organisms the following on fur-bearing animals is given. Interesting lessons on these animals have been developed in Michigan, Florida, Maryland, Louisiana and in CRSL. *Nature Magazine* has published a valuable series of colored pictures of these animals.

Initial Experiences. Recognition of superficial qualities of fur so far as warmth, texture, length, color and thickness are concerned. Compare pelts of living horses, sheep, hogs, dogs and cats. Notice when dogs shed hair as an introduction to the idea that season of year affects value of pelts. Recognize superficial differences in tracks of animals; that each animal makes its own kind even on city streets where

IN TENNESSEE ON HUNDREDS OF SCHOOL GROUNDS CHILDREN BUILD EROSION CONTROL DEVICES, PLANT TREES, MAKE WILDLIFE FOOD PLANTINGS AND LEARN CONSERVATION IDEAS, BUT . . .

tracks of men, women, children, horses, cats and dogs may be seen. Keep pets such as rabbits. Notice if animals show evidence of pain when pinched.

Second Level. Improve ability in tracking to include interpretation not only of kind of animal but direction taken, speed, size and, possibly, condition. Keep diaries to show times of year when wild mammals make their presence known and how they do this. Where possible study homes and burrows and make collections of hairs taken from burrow entrances even though they may not be identified. Get some idea of the species found locally and, where they may be seen, make comparisons to show how the aquatic, terrestrial and arboreal types differ appropriately to their habitats. If young are observable, get records on them as to number, appearance and behavior but do not go to trouble to get this from books.

Third Level. Make maps showing geographical distribution of familiar local species. Visit fur store to get some idea of kinds of names used in connection with local

species when their pelts enter trade. Get from U. S. Biological Survey list of fur-bearers taken in different states and compare home state with others. Notice whether the "take" locally is increasing or decreasing. Make a survey of furs worn locally and attempt to get an idea of how long a given piece has continued to be useful. Determine, if possible, whether this is due to kind of animal, nature of care given the fur, or to other causes. Understand relatively complete life history of a few representative species. Continue, where interest warrants, studies started at lower levels.

Fourth Level. Emphasize seasonal behaviors of fur-bearing animals. If trapping is to be done, investigate the possibility of the traps designed to trap animals humanely and alive, thus permitting selection of animals being harvested to the end that supply may be maintained. Get such bulletins as those issued by New York State College of Agriculture on proper methods of capturing animals and processing the pelts. Learn conditions under which trapping may be done locally and get some idea as to extent to which regulations are respected. Investigate value of the living animals. Are they natural enemies of pests such as mice and are they worth more alive than dead because of this? Do they, as the beavers do, dam streams and thus assist in flood control? If the animals are being harvested do their carcasses have food value?

Fifth Level. Recognize the im-

... THE TEACHERS IN THIS SCHOOL SAID THAT THEY DID NOT TEACH CONSERVATION FOR LACK OF MATERIALS TO WORK WITH, AND WERE AMAZED THAT THE BAD EROSION IN THE SCHOOL YARD HAD A MEANING



portance of the following steps in determining use to be made of a fur-bearing animal. 1. Value of the animal alive vs. dead, and number available for harvest without interfering with the breeding stock. How the take can be regulated to maintain a supply. 2. Harvesting procedures. Are animals harvested when pelts are most valuable, and with a minimum of physical injury, as humanely as possible, that is, without the use of barbarous steel traps? Are the skins removed and cured so that they will bring the highest market price and stored so as not to depreciate? 3. How are the skins processed for the market by the manufacturers? What deceptions should be expected? How are inferior pelts used? What becomes of the trimmings and other by-products? 4. Marketing and care of finished product. How should furs be cared for in winter and in summer to lengthen their lives and thus relieve the drain on the living animals that supply the raw material and also to lessen the annual cost of the garment to the owner? Get bulletins of fur-storage houses telling of

methods they use in care. What are some of the natural enemies of pelts, such as buffalo bugs, and how may their activities be controlled? Review and extend appreciation of biological balance and the rôle of the fur-bearers here. Study the rôle of the fur-trade in establishing political units as shown by the United States getting ownership of the Northwest.

Sixth Level. Review vocational opportunities associated with fur-bearing animals, such as fur-farming, research and investigation, marketing, processing, game management. Get an understanding of the international implications surrounding fur resources as shown by the seal industry and its bearing on other industries such as fishing. Renew appreciation of the value of the live animal to the Nature lover, the agriculturalist and to other human interests. Make a study of legislation in the fur industry and

decide how it might be improved. Review possibilities of increasing return to man locally from wise use of fur-bearers, either for their pelts or their other services. Study possible fur substitutes.

Other systematic units that might be developed in this way would include the following, with references as to where useful material in this connection has been prepared:

Mammals; Man; Washington, D. C., Pa., Kans., Ariz., N. M. CSG; *Game Mammals*; W. V., Fla., CSG, CRSL; *Mammals in general*; Fla., Mich., Wis., CSG, CRSL, NM; *Birds (General)* Fla., Appleton, Wis., CSG, CRSL; *Game Birds*; W. V., Wis., Fla., Mich., Ga., Mo., CRSL, NM; *Reptiles*; N. J., La., Ia., CSG, CRSL, NM; *Amphibia*; CSG, CRSL, NM; *Fish*; W. Va., Fla., Mich., Ia., Pa., CSG, CRSL, NM; *Insects and Other Invertebrates*; Fla., Okla., CSG, CRSL, NM; *Woody Plants*; Fla., Mo., N. Y., O., W. V., Wis., Mich., Ill., Ind., Tenn., Mass., CRSL, CSG, NM; *Non-woody Plants*; Wis., Mich., Conn., Ia., O., Wy., N. Y., CSG, CRSL, NM; *Rocks and Minerals*; Kans., Wis., Fla., CRSL, CSG, NM; *Soils*; W. V., Kans., O., Wis., D. C., Tex., Colo., S. D., CSG, CRSL; *Natural Gas and Oil*; Tex., Fla., La., Water; O., Wis., Fla., Tex., CRSL, CSG, NM.

Organization on the Basis of Social Science or Man's Interest

The units represented in this type of organization are essentially concerned with man. They have to do with his economic problems, his esthetic desires, his social needs, his techniques for bringing about changes in the activities of man, of other organisms and of the inorganic field. The old human geography was a forerunner of this type of work.

Four main categories may be recognized in these units. These involve:

1. Survey of existing resources, including research on potential value, economics and profitable techniques.
2. Intelligent management for wise use of the available resources.
3. Education leading to a wider adoption of a sound policy.
4. Legislation for defining the obligations of individuals and groups, and enforcement to bring about the desirable ends.

It would seem that many of the conservation programs defended by different agencies fail largely to recognize the many-sided nature of the problem. Some Conservation Departments satisfy their public relations obligations by rewarding their officers by advancement in accordance with the number of convictions they get of people who have failed to practice conservation. Thus a man can advance fastest where conservation is practiced least. Fortunately this type of philosophy is losing supporters, but few states or communities grant to education in conservation funds equal to those they readily give for the prosecution and capture of law violators.

Units of the *survey* type would include examination of existing resources, of the historic setting, of the vocational possibilities, of the economic importance and of the value recreationally and esthetically of the resources considered. It would consider the unique needs and opportunities supplied by the place studied, whether this was a small farm or the whole continent.

Units on *management* would concern themselves with problems of handling renewable and non-renewable resources, of planning for regions for multiple use, to the end that a maximum of power, fur, enjoyment, food and leisure may be enjoyed by the community. Under it might come such a problem as one of predation, in which it would be shown how predators are valuable in reducing sick individuals of game species and in keeping down destructive rodents. Such a program would show how the numbers of predators are determined by Nature in accordance with the needs of a balanced life in the wild.

Units on *education* would recognize the differences between education and propaganda, as well as an appreciation of the need and value of research. It would deal with the techniques of education and consider the important educational agencies engaged in this work.

Units on *legislation and enforcement*

would naturally involve an understanding of existing laws bearing on natural resources, especially showing why certain laws are necessary. This would include understanding why certain species have closed seasons at certain times, why bag limits are as they are (if this can be understood), why baiting has become illegal and what changes are needed for improvement of present conditions.

Proposed development of such a management unit as pollution might be along the following lines:

Introductory Experience. What happens to life in unbalanced aquaria? What happens to trees where gas mains leak, or near factories where fumes are bad? What are signs of health or disease in local plants and animals?

Second Level. Where are wastes disposed of locally, and what conditions exist there? If in the country, where is dishwater dumped and what becomes of barnyard wastes?

Third Level. Study waste problems of the great river systems with their effect on fishes. How do wastes from oil tankers affect water birds and their food?

Fourth Level. Do something personally to improve pollution problems locally, even if it is nothing more than keeping one's person more clean.

Fifth Level. Recognize conflicting problems of pollution to industry and activities depending upon living things. How do organic and inorganic wastes differ in their effect on life in streams? Understand rôle of oxygen and photosynthesis in living things.

Sixth Level. Emphasize how to bring about improvement rather than just the indictment of wrongs. Study sewage disposal practices, the possible use of organic wastes as food for fish food organisms. How tell accurately the degree of pollution of a region?

Probably the West Virginia outline will be found to give the richest help in developing this type of program but useful material has been published from Tennessee, Wisconsin, Texas, New Jersey, Kansas and Ohio along similar lines.

It is hoped that these proposals will be recognized as simply suggestive of the material available, and that the discussion here shall not be considered as adequately covering a most important aspect of conservation education.

Organization on the Basis of Scientific Principles and Experience Realms

This type of organization appears with many modifications. It is commonly represented in most outlines in one form or another, but tends to become academic where it is emphasized too much. However, it lends itself easily to other types of organization and has the advantage that it can readily be applied to almost any objective materials.

Where there is great variety of forms for study in a state, or other political unit, it is superior to organization around taxonomic or systematic units, since the representative birds, mammals or fishes significant locally may be used. For exam-



ple, a study based on a "fox squirrel" might be appropriate only where fox squirrels were found, but where the study was one of "biological balance" the fox squirrel, or the red squirrel, or a gopher, might be used as illustrative material. One state outline written by a person unfamiliar with the state suggests the study of creatures that have long been absent from—or never have been in—its fauna. Were the outline based on principles or realms of experience this situation would not be likely to be serious.

There is danger in an outline organized around principles that too much emphasis may be placed on the recitation of a series of high-sounding principles or generalizations without relying on basic and significant experiences. To avoid this, *Nature Magazine's Guide to Science Teaching* tried to steer a course which would not call for this sort of thing. This *Guide* supplies an abundance of rich material integrating *Nature Magazine* material with this type of organization.

As an example of sequence of this type of organization we use one dealing with Space Measurement and Mastery, inasmuch as this deals with such dynamic conservation matters as the problems of migratory species and the international and inter-state issues that this habit raises. Differing from the previous type of organization, this study is not limited to a species or group of species, but has a bearing on fishes, birds, mammals, quarantine, and even jumps out of this field to consider such things as erosion and pollution problems where an activity in one region creates a changed condition elsewhere. In other words, it deals with problems involving necessarily two or more given localities, whether these be a foot apart or miles apart.

Initial Experiences. How things get from place to place. Study how things move over the ground as do snails, snakes, crabs and rabbits; how plants occupy bare spaces; how soil is washed from one place to another or held in place; how fish and aquatic insects swim; how sediments are dropped or held in suspension; how things move through tree tops; how things move through the ground.

Second level. At this level, introduce studies of speed and direction. This may well be correlated with arithmetic and directional geography. Examples of observations would include recognition of direction of flight of birds at different seasons, at different times of the day and under different weather conditions. It would involve practical problems of avoiding being lost or found, whether a child or some form of wild life.

Third Level. The purposes of making trips and the means by which they are made. This includes simple studies of the routes of migratory birds, mammals, frogs and fishes, seed and spore distribution of plants and the racial migrations of humans over the face of the earth. Winter and summer range studies should be introduced, and should include not only extensive migrations over the earth and through water but less extensive migrations vertically through the soil to above and below the frost line. This is highly important in understand-

ing problems of survival of many plants and animals.

Fourth Level. Study the adjustments we make to the habits of migratory animals whether they be mosquitoes or flies, shad or bass, rabbits or squirrels. Develop judgment in determining size of areas. Get some idea of individual territory of grouse, deer, quail and other species to determine potential populations of an area.

Fifth Level. Study the work of explorers of today and of the past, comparing the techniques and equipment used by the different groups whether they explore high altitudes with balloons, the depths of the sea with bathyspheres, the depths of the earth with mines and seismographs, the ice-covered polar regions, the dry deserts or the humid jungles. Rationalize the work of these explorers by making significant local trips involving problems similar to those of the more famous workers. Investigate the difficulties of species like seals, whales, ducks and salmon that may spend some of their time outside the limits controlled by any one nation.

Sixth Level. Study the vocational opportunities associated with space mastery, as well as the legislative problems involved in shipping game and other natural resources from state to state and country to country. Read such books as Akeley's accounts of Africa, Andrews' *Ends of the Earth*, Say's, Bartram's and Audubon's early explorations in America and Byrd's polar explorations, noticing how these explorations had a bearing on determining present, past and future wealth of natural resources. Space studies involving location of sanctuaries, resting areas for migratory species with help in planning these locally should be included.

Other units which might be considered under this type of organization would include the following:

Food; W. Va., Kans., Tenn., Pa., S. C., CRSL, CSG and *Nature Magazine's Guide to Science Teaching*, hereafter NMSG. *Cycles and Sequences;* including life histories, life successions, climax forests and so on. Also included here would be studies on reproduction, growth and all problems involving the future of anything in terms of its present and past; O., Wis., Pa., CRSL, NMSG. *Protection;* this includes shelter problems and similar studies; W. Va., Kans., Tenn., Mo., CRSL, NM, CSG, NMSG. *Signs of Instinct or Intelligence;* important in game rearing of temperamental animals and in management of temperamental humans; NMSG, CRSL. *Balance;* including predation, population studies and the like; NM, W. Va., Wis., Mich., O., CRSL, NMSG. *Tropisms;* or reactions to forms of energy such as electricity and its power problems, to heat, to light, to weight and so on; D. C., CRSL, NMSG. *Origins and Ancestry;* involving historical problems; W. Va., Wis., CRSL, NMSG.

Organization on the Basis of Ecological Units

This type of organization builds around types of places such as swamps, forests, deserts and the like. This system is a natural one, considering at one time the things normally found together. It lends itself to emphasis on local units, but often teachers are unaware of small deserts or small lakes in their own back yard. The ash dump may be excellent for studying deserts just as icicles suggest the study of glaciers. It is a definitely realistic system and, if small units are used, is possible anywhere.



Because deserts are not commonly recognized as being near at hand this unit may be developed here. It is suggested that the study of real deserts might be enriched by using such books as *Deserts* by Gayle Pickwell, published by McGraw-Hill Company.

Initial Experiences. Recognition of local spots with the properties of deserts—dry; relatively free of plants and animals; usually exposed to the sun and wind; soil loose and relatively unanchored. How many such spots can be found on the local school grounds, and what things, if any, live there? Watch the work of ants and other animals in such a situation to see how they manage to live.

Second Level. How long do local minor deserts exist? How many of the plants have reduced leaves, prickles, milky juice or waxed and succulent stems compared with those outside the desert area? How many of the animals occupying a desert area burrow for protection?

Third Level. Learn the desert areas of the earth and the kinds of life found there. Examine magazines for pictures of desert life. How do saline or salt deserts, alkaline deserts, sand deserts and deserts of frozen regions differ from each other? Notice how wind blows dirt from small desert areas to understand dust storms and dust bowls.

Fourth Level. Study deserts of the past and their relation to mineral deposits of the present. Understand how great salt deposits have been laid down; how the loess and gumbo of the midwest have been built up; how the sand dune areas around the Great Lakes and elsewhere have been produced.

Fifth Level. Study deserts in international affairs; how they affect peoples. Notice how, in places where cattle are numerous around waterholes, the vegetation is reduced by their activities; how this may lead to adjacent small desert areas. Show how such a situation may be extended, and how it is related to grazing problems.

Sixth Level. Study the professions that have contributed to the increase or decrease of desert areas. Notice what has happened where engineers spent much effort and money to drain wet spots and straighten streams. How did these engineering projects affect persons engaged in agriculture, industry, pleasure, and wildlife problems? What is the effect of major reclamation projects and their relation to world affairs?

General Reference Materials

1. *Bibliography on Soil Erosion and Soil and Water Conservation* by Stanley H. Gaines. Miscellaneous Publication No. 312 of the U. S. Dept. of Agriculture.
2. *Bibliography on Land Utilization, 1918-36*, by Louise O. Bercaw. Miscellaneous Publication 284. U. S. Dept. of Agr.
3. *Good References for Conservation Education in Secondary Schools*, Bibliography No. 55; *Good References for Conservation Education in Elementary Schools*, Bibliography No. 70; *Good References on Conservation of Trees and Forests for Use in Elementary Schools*, Bibliography No. 71; and *Good References on Conservation of Birds, Animals, and Wild Flowers for Use in the Elementary Schools*, Bibliography No. 72. Publications of the Office of

Education, Washington. 1938.

4. *The Elementary Science Library* by Eva L. Gordon. Cornell Rural School Leaflet, September, 1938.

5. *Conservation Guide* compiled by the Conservation Committee of The Garden Club of America. 1939.

Examples of useful bibliographies of local significance, which might be used as models for preparing similar reference lists, would include those in the following:

West Virginia. *Units in Conservation*, Volume I. *Elementary Schools*, Volume II. *Secondary Schools*. State Conservation Commission and State Department of Education. 1939.

Conservation Bibliography for Teachers. Educational Service, Tennessee Department of Conservation. 1938.

General Units Covering Elementary and Secondary and Collegiate Schools:

Representative programs or conservation units which seem to be among the better ones are as follows:

1. *Saving Soil and Water* by J. Wright Baylor, useful primarily in the Northwest. Union Printing Company, Spokane, Wash.
2. *Teaching Conservation in Wisconsin Schools*, 1937, and *Helps in Teaching Conservation*, 1938. State Department of Public Instruction of Wisconsin.
3. *The University and Conservation of Wisconsin Wildlife* by Aldo Leopold and others. University of Wisconsin. 1937.
4. *Wildlife Conservation in Tennessee*, Educational Publication No. 1: *The Forest, A Resource. A Protector of Resources*, Educational Publication No. 2. Tenn. Dept. of Conservation.
5. *Conservation in the Education Program* by William Bristow and Katherine M. Cook. Office of Education, Washington. 1937.
6. *Conservation of Natural Resources*. Outlines of Instruction for Educational Advisers and Instructors in Civilian Conservation Corps Camps. Vocational Series No. 7. Office of Education, Washington. 1935.
7. *CCC Forestry* by R. H. Kylie, et al. U. S. Forest Service.
8. *Suggested Outline for Study of Conservation* by Sarah W. Partridge. Commission of Game and Freshwater Fish, Florida.
9. *Wild Life Issue*, Soil Conservation. Soil Conservation Service, Washington. March, 1939.
10. *Teaching Conservation in Minnesota Schools* by George Friedrichs, St. Cloud, Minnesota. 1939.

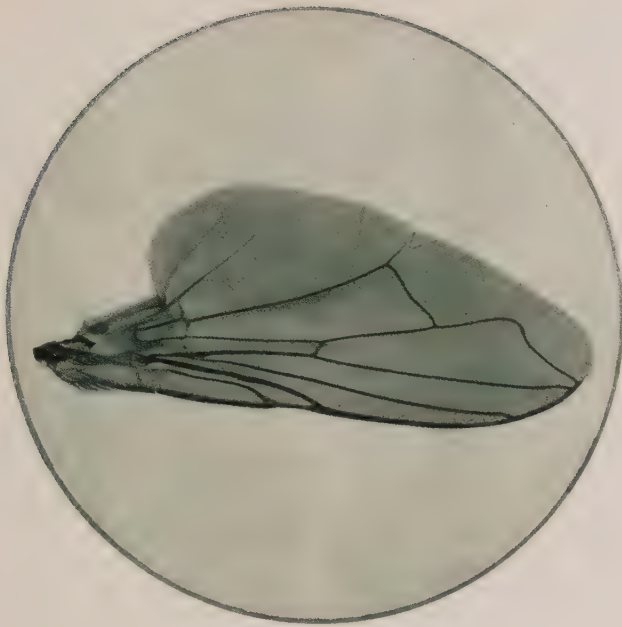
Units for Use in Secondary Schools:

1. *West Virginia Units in Conservation*, Volume II. Conservation Commission and State Department of Education. 1939.
2. *Erosion, Classification of Water*. Junior-senior high schools. Division of Conservation, Ohio.
3. *Forest Conservation, A series of Units for High School Social Studies Teachers; Forest Conservation, A Forest Service Guide in the Social Studies*. Forest Service. United States Department of Agriculture. 1937.
4. *Conserving Nature's Gifts to America*. A correlation of mathematics and conservation. Curriculum Bulletin No. 7104-J. Houston Public Schools, Houston, Texas. 1938.

Units for Use in Elementary Schools:

1. *West Virginia Units in Conservation*, Volume I. 1939. See above.
2. *Conservation. A Course of Study for Public Elementary Schools*, by Benjamin Rohan. Appleton, Wisconsin. 1937.
3. *Conservation Units for Elementary Grades* by Irene Huss, South St. Paul, Minnesota Public Schools. 1938
4. *A Report on the Study of Conservation Made at John Ericsson School* by Jennie Hall. Minneapolis, Minnesota. 1935.
5. *Conservation of the Soil. A Unit for Elementary Schools*, Soil Conservation Service. Section of Information. 1939.
6. *Gone with the Wind and Water* by O. E. Fink. Zanesville, Ohio. 1938.
7. *Rain and Water*, Primary Grade and *Water Distribution*, Elementary Grades. *Erosion*, Intermediate Grades. Division of Conservation, Ohio. 1936-37.
8. Units in soil conservation for elementary grades in southwestern United States by Raymond and Tappan. Soil Conservation Service, Albuquerque, N. M.





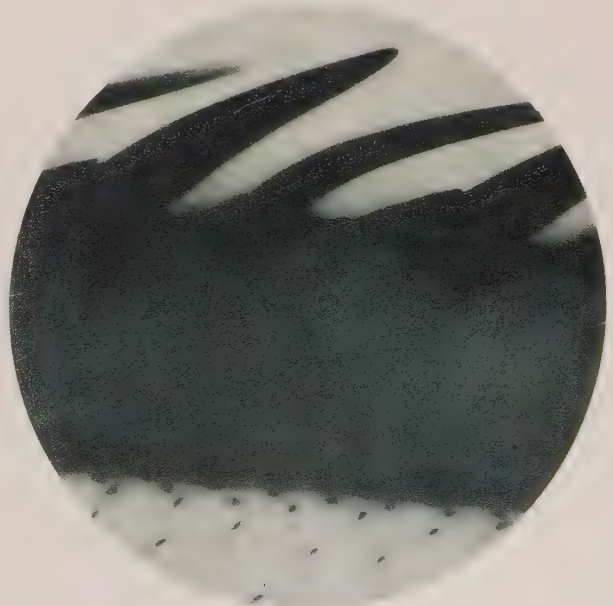
fifty times. Note the two claws that are used for clinging to rough surfaces and the two sticky pads for smooth surfaces. These are the germ carriers. They pick up something from that on which the fly lights and its next stopping place may be food, where it zealously sets about cleaning off its foot pads.

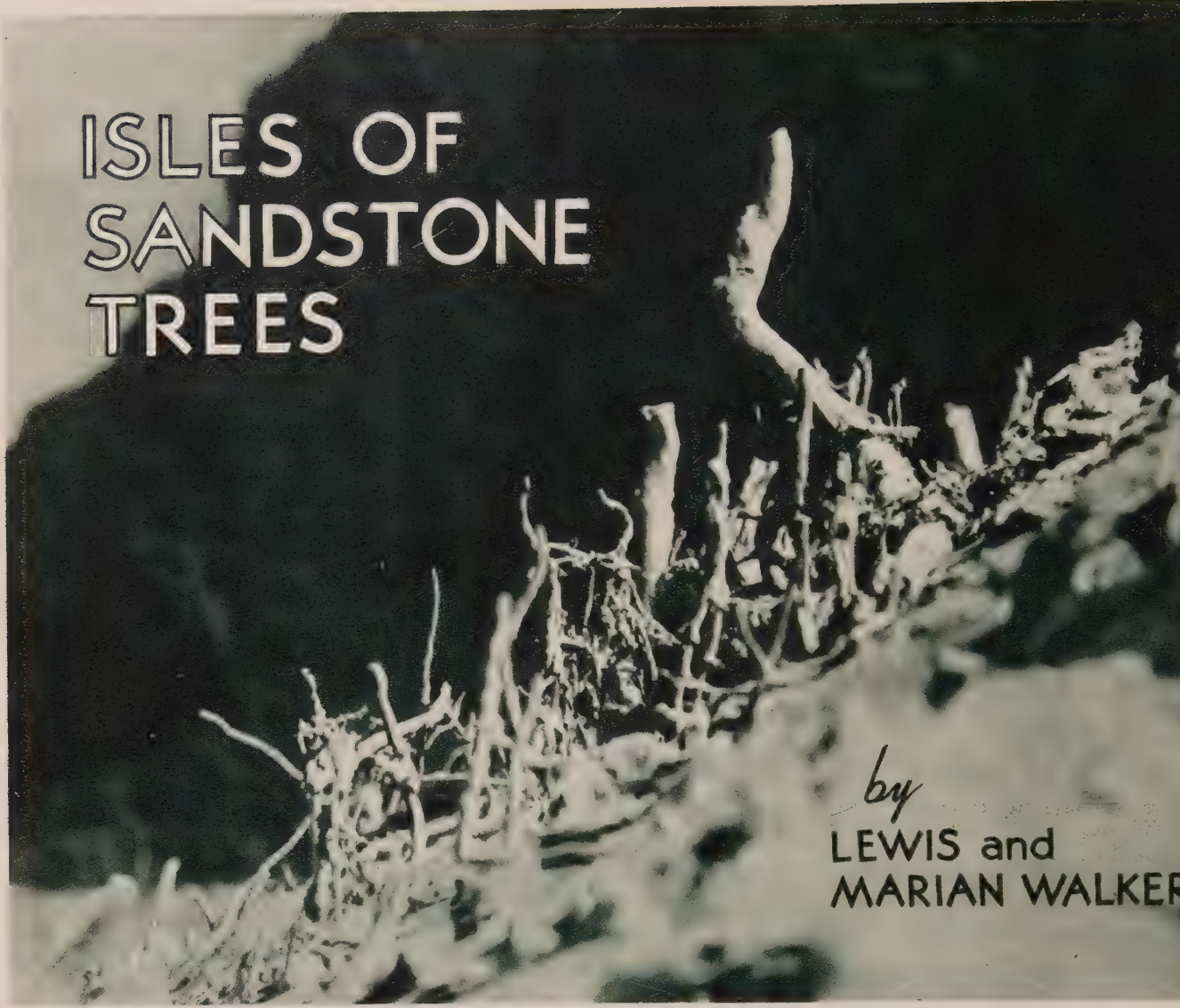
Then we see the front view of the fly's head enlarged to fifty times its real size. The many segments forming the eye may be seen here and are more vividly shown in the picture at the top of the left hand page. This picture is magnified seven hundred times, and is only a section of the whole eye.

On this page we see the wing of a fly enlarged only ten times but effectively showing its structure. Next to it is the tip of the same wing magnified fifty-five times. A magnification of two hundred times brings out the details of the framework of the wing and shows the tiny hairs along the edge of the wing. When the magnification is stepped up to one thousand diameters we see these hairs in greater size.

Students of the fly tell us that every time a fly lifts its foot it is as though a human were walking with forty pounds tied to each foot. This is caused by the sticky pads on the insect's feet. If you have ever tried to walk upside down on the ceiling you can realize how sticky these pads must be—or even if you haven't tried thus to defy gravity.

There are usually eleven generations of the house fly during the year. Each female lays about two hundred and forty eggs. If all of these hatched they would produce enough flies to make a blanket three feet thick all over the surface of the earth. Fortunately Nature allows only a few of the eggs to hatch. But, even so, it behooves us all to keep right on swatting the fly.





ISLES OF SANDSTONE TREES

by
**LEWIS and
MARIAN WALKER**

Far off the coast of California lie two tiny islands, perpetually windswept, always desolate, rapidly shrinking in size. Their surfaces are marred by precipitous arroyos. During the wet season, rains unchecked by vegetation rush from the higher parts and wear away the sandstone core. Summer winds, carrying sand with blasting force, reveal interesting geological formations in the strata that have been uncovered.

Chief among these formations are the thousands of sandstone tree casts that were fashioned centuries ago as the result of a series of climatic changes. First, predating the time of Columbus, these coastal islands were drenched with rain, causing the growth of trees and shrubs in great number. Then came a period of drought. Sand swept across the fertile forests, burying them from sight. Then again came rain, bringing about a luxuriant growth on the sand. Land snails thrived and literally "took" the islands, eventually denuding them of every green thing, which brought about their own destruction. But they served their purpose in the sequence of events that produced the sandstone trees. Their tiny shells, of which you can still count one hundred or more to the square yard, impregnated the sand below with lime. Rains carried this lime to the hidden forests lying deep beneath the surface. With the gradual rotting of the wood pulp, an impregnation of lime-cemented sand took on the form of the trees, encasing even the root systems.

Today, hundreds of years after a forest flourished on San Nicholas and San Miguel Islands, the trees are once more coming to the surface like inverted stalactites. They can stand the wind and its accompanying sand blasts only temporarily. Some that must have been forest giants with trunks eighteen inches at the base, now stand about four feet high in protected spots. The horizontal branches seem to be the first affected by erosion, and naturally, they are rare. The loose sand has been swept away from some of the trees until their root systems are exposed and sprawl about above the ground.

Were it not that these islands were inhabited by prehistoric Indians, the time of the growth, and the chain of events which figured in the formation of these casts, would be a deep mystery. According to archaeologists there have been three Indian cultures as determined by the middens that dot the islands. We know nothing of the earliest race aside from the fact that their tools are of the crudest design made of just what the islands afford—shells and bone.

The time of occupancy of the second culture would also be a rash guess, because of the shifting sand dunes, were it not possible to tie them up with the Indians of the mainland through their use of homogeneous objects. This race was known as the Chumash, or Canalino, dominating three of the eight channel islands; namely, Cata-



On these strange and desolate islands off the coast of California we find a formation that intrigues the interest of the botanist and the archaeologist. On the opposite page we see one of the forests of little trees that are found only in sheltered spots. Above we see a typical sandstone root system caused by the vagaries of climate and the ages. Below is a former forest giant with parts of the wood core preserved within its encasement of sandstone.





One of the larger trees with a trunk diameter of fourteen inches. Trees of this size are rare, and, indeed, remarkable in view of the vicissitudes to which they have been subjected.

lina, San Clemente and bleak San Nicholas, the latter sixty miles from the nearest mainland. This people inhabited these island outposts about the 14th and 15th centuries.

Then came the Shoshone who conquered the Chumash, and who, in turn, were conquered by the Spaniards. When we run through this Indian history and correlate it with the sandstone casts, we can arrive at a calendar of sorts. The trees were growing above the middens

of the first island culture, while the middens of the Chumash and the Shoshone overlie the sandstone casts. The logical deduction would therefore date the existence of these trees as prior to America's discovery.

Subtly fashioned by a combination of natural forces over a long period of time, these tree casts are destined to be short-lived. Wind and sand, which played such an important part in their creation, are now actively engaged in their final destruction.

A close-up of some sandstone branches. It is difficult to read the history of these trees and to suggest their age. It is best approximated by a study of three vanished Indian cultures on these desolate islands.



★ Conservation ★

A part of Nature Magazine each month is devoted to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.



NATURE ★ AND WAR

In the motion picture "All Quiet on the Western Front" one scene remains vividly in the memory.

A butterfly flutters down on the shell-torn ground in front of the German trench. A young German soldier reaches out for this bit of beauty. A bullet crashes into his brain and the butterfly flits away.

When we saw this great motion picture, with its indictment of war, we, who had ourselves known three years of warfare intimately, thought that it was historical; that such scenes could not again be actualities. Now another war has been loosed upon the world; a war also potential with disaster to humanity and national sanity. It is not fitting here to discuss the political, military, economic, social, or even spiritual implications of this present conflict. Yet we do feel that there are certain thoughts that relate to the present state of the world that may properly be set forth here.

A war between important nations cannot be isolated from the economy of other countries, nor can partisanship by individuals in the non-combatant countries be avoided. Thus there is always the possibility of involvement, whether for reasons of self-preservation—real or assumed—or because hysteria by some partisan faction may prevail and precipitate the nation into the conflict.

It is this hysteria that is the most dangerous influence in times of war. To meet its insidious power demands a national sanity, and a proper sense of proportion, among the effective majority of individual citizens. When hysteria prevails all normal values are distorted, destroyed, or subjugated to the urge to war. It seems plain, therefore, that if we are to prevent hysteria, and its fatal by-products, we must keep in clear focus our appreciation of the values that make national and individual life worth the living.

A specific example of both the destruction of physical and sentimental values in time of war may be cited. For many years foresters and conservationists have pointed to a forest near the city of Forbach that has been producing timber, year after year, for some three centuries, through

a system of sustained yield and selective logging. As this is being written armies are fighting through this forest; shell fire is making it a shambles; its yield is blood and death. Thus does war literally destroy something that is an example of conservation, and, even more important, it endangers the ideal and the idea for which it stands.

But there is deeper and less tangible destruction of values when the world becomes embroiled in war. When the German boy reached out toward the butterfly it was because the shimmering insect represented a value he had known in times of peace; the beauty of Nature; of trees and flowers; of the song of a bird; of the glint of the sun on the coat of a deer in the forest. In those memories—in Nature—there lay normality. The butterfly, in this hell between the trenches, stood for these things. And should mankind stop reaching for such values, all hope is gone.

In Nature there is sanity; balance; a plan. She offers simplicity; quiet; solace for the mind and spirit. Hysteria cannot prevail against the rustle of a breeze in the trees; the glory of a sunset; the lilt of the thrush's song at evening. Hysteria is a product of man in the cities; on the platform; in unreasoning masses.

Nature, undisturbed, proceeds upon a plan. While life in the wild may often seem to be cruel, with those who prey and those who are preyed upon, it is logical and sound. It remained for man to introduce illogic and cruelty into existence. If he would abandon his pursuits of war, and heed Nature, he would learn much.

We believe that if we could take the leaders of this present world conflict to a high alpine meadow in Glacier National Park, for example, far from the highways and all the other refinements of our vaunted civilization, and there talk and climb, watch the mountain goat on his crag and the bear in his wanderings, the story might well be different. If there, together, they could breathe the pure air of the outdoors and not the fetid atmosphere of pub, bistro or beer hall, and sleep beneath stars undimmed by city lights, we believe that hatreds might be dissolved, and not intensified in defiance of all that is natural.

Things to Think About

Through a systematic count carried on cooperatively by employees of the United States Biological Survey and the National Park Service, it has been determined that there are at least 199 trumpeter swans in the United States. This is an increase of 51 since August, 1938. The compilation showed 109 on Red Rocks Refuge (discussed in *Nature Magazine*, August-September issue, Page 397), twenty on adjacent lakes, and 70 in Yellowstone National Park. The count is believed to be conservative since some of the adult pairs observed appeared to have cygnets, but their offspring were not detected.

• • •

After completing the second nation-wide survey of big-game animals, the Bureau of Biological Survey reports nearly six million in the United States. This is an apparent increase of one million since 1937, but it is pointed out that there has been a marked improvement in the counting and estimating technique. Deer account for five and one-third million of the six million animals reported, and Michigan, Pennsylvania and California lead in the number of big-game animals within their borders. In contrast to the number of deer, only 16 woodland caribou were reported, twelve in Minnesota and four in Washington. Delaware has no big-game animals.

• • •

Roadside zoos, which should be outlawed or strictly regulated by law, are serving as "come-ons" for what is known as the "Hazard Game" in several parts of the West. A number of them have been established near the entrances to National Parks on private property, obviously to catch the attention of motoring visitors to the Parks. One such reported to us is at Babb, Montana, where two eagles, one porcupine, four young coyotes, one weasel and two badgers are housed in small, unsanitary cages as adjuncts to the game. The manager said he had no license to maintain the "zoo", but claimed that the local game warden said it was all right. Although there is no justification for these zoos, and actually they should be banned by law, if they cannot be thus eliminated they should be licensed and carefully inspected, and the cages and condition of the confined animals kept at high standards.

• • •

The Pennsylvania Game Commission has issued a leaflet explaining its plan for special wildlife refuges. This is a variation of the cooperative campaign with farmers, and has as its object interesting sportsmen's groups in establishing areas that will be in part sanctuaries and in part public shooting grounds. The area devoted to sanctuary purposes and safety zones around buildings may not be in excess of one-third of the total area. The remainder of the land must be open to public hunting. Signs made available

by the state, and with a place for insertion of the name of the sponsoring group, read: "Special Wildlife Refuge. Hunting is Unlawful. This refuge is provided so that wildlife may have a place to escape and breed in safety. Entering this Refuge for the purpose of hunting or disturbing wildlife or permitting dogs to enter is punishable by a penalty of twenty-five dollars. The lands surrounding this Wildlife Refuge, except Safety Zones, are open to public hunting." The program was worked out earlier this year and is just getting under way.

• • •

Authorization of a pollution control program involving expenditure of \$10,428,000 was given at the recent session of the Massachusetts Legislature and approved by Governor Saltonstall. This action came as a culmination of a five-year fight to remedy terrible conditions caused by sewage along the South Shore of Boston. A special recess committee of the Legislature had studied the situation and recommended a twenty-five-million-dollar program. The long hard fight to make a start on cleaning up filthy and unhealthful conditions illustrates the need of Federal legislation with enforcement provisions to speed up solution of this problem. It is hoped that at the next session of the present Congress the Mundt Bill will be substituted for the toothless Barkeley Bill, passed by the Senate, and that a really effective measure will be enacted into law.

• • •

The Educational Conservation Committee has drafted a bill to be filed with all state legislatures to provide for the teaching of conservation in the schools. It is to be hoped that this legislation will be given thorough consideration by legislative bodies and serve to focus attention on the importance of this subject in the school curricula. At the moment there are varied opinions as to the best methods of approach. They vary from prescribed courses in conservation to inclusion of conservation ideas in a number of the present studies. Several independent studies of the question are now being made.

• • •

The Two Eagles of North America is the title of a new, revised and improved edition of the Conservation Teaching Unit of the Emergency Conservation Committee. Written by Ellsworth D. Lumley, with an introduction by Francis Hobart Herrick, this leaflet is a splendid presentation of the facts about and the plight of these birds. Copies are available from the Committee, 734 Lexington Avenue, New York City, at ten cents each.

• • •

Interesting and valuable, both historically and as a commentary on predator control, is an article by Victor H.

Cahalane in the July, 1939, issue of *The Journal of Wildlife Management*. Entitled "The Evolution of Predator Control Policy in the National Parks", the article goes back to the beginnings of our National Park system with the creation of Yellowstone National Park, established in 1872. Administered by the Army until 1916, its history provides interesting variations in the attitude toward predatory animals. A knowledge of this is essential to an understanding of the present policy. Space does not permit extensive review of Mr. Cahalane's fine article, but we commend it to all interested in this important wildlife subject, and in acquiring information on it. In his summary the author says:

"It is evident that the national park predator policy in its various stages of development over the past sixty-seven

years has, on the whole, reflected the most advanced thought on the subject. Changes have been necessitated by special legal or natural limitations, and effected also by public sentiment and facts brought to light by scientific inquiry. Unfortunately the rapid recovery of hoofed mammals following near-extirmination early in the twentieth century was but imperfectly perceived and predators were persecuted in the parks for at least a decade after they had become vitally necessary to maintenance of a balance. Our present problems of over-grazed ranges are in considerable measure due to this lag in human perception of cause and effect. A forecast of future trends is brightened by the knowledge that many past difficulties can be avoided by adherence to the policy of basing protection entirely on scientific investigation and ascertained facts."



UNIQUE NATURE EXHIBIT



Unique among Nature exhibitions is that to be held under the auspices of the New York State Nature Association in the Lansing Gallery of the Albany Institute of History and Art. There will be an extensive exhibit of Nature sculpture by some of the world's leading sculptors; a display of medals and coins with Nature designs and like the one reproduced above; sections devoted to bird and mammal paintings, drawings, lithographs, etchings and wood carvings. The names of the exhibitors in the several classifications are known to everyone interested in the arts. It is expected to be the most comprehensive presentation of mammal and bird subjects ever assembled. The exhibit will be displayed from November 8 to November 29, inclusive.

The New York State Nature Association, whose president is W. J. Schoonmaker, and whose address is P. O. Box 927, Albany, New York, has as one of its many splendid objectives the encouragement of "the study and appreciation of all wild life and other natural resources." This exhibit is a tangible way of carrying this objective into effect and of dramatizing Nature. Feeling that others interested in Nature and conservation, residents of New York as well as other States, will be interested in the

other objectives of the Association, we report them here:

"To protect and preserve native wild life, not as game, but as creatures having their definite place in the scheme of Nature.

"To protect plant life and other natural resources, also, for their artistic, esthetic and economic value.

"To strive to give both children and adults an opportunity to study, photograph, draw, model and become acquainted with animals that are without fear of the hunter and trapper.

"To encourage and sponsor photographic and art exhibits, lectures, motion pictures, prize picture contests, newspaper and magazine articles and non-technical, interesting and truthful publications of subjects pertaining to any phase of natural history.

"To create absolute sanctuaries by the posting of land, so that no hunting, trapping, or the taking of any wild life, or the destruction of any nests, burrows, dens or den trees will be permitted on that land.

"To oppose crow shoots, organized poison campaigns and wholesale animal destruction.

"To urge that if wild life must be controlled in certain areas, only humane traps shall be used and that if other means must be employed they shall be only the most humane methods known; also to oppose any inhumane action by individuals, groups or organizations.

"To act in emergencies to aid and save wild life during winter, fire and flood.

"To promote legislation to further our cause.

"To encourage the organization of local chapters of the association throughout the state, and to advise and aid such chapters."

IT'S DONE WITH MIRRORS

Ducks Unlimited still pursues unsound theory

By TONY LASCELLES

FOR THE past two years, residents of the prairie country of western Canada have witnessed the initial stages of an experiment unique in the annals of applied biology—the work of an organization of sportsmen assisted by a staff of workmen and amateur ornithologists, known as Ducks Unlimited (Canada). The avowed purpose of this activity is miraculously to restore the ever-decreasing numbers of ducks to the population values of other days.

It is said that several million dollars will eventually be spent on this remarkable project to restore and maintain water levels in certain prairie lakes and to encourage the breeding of ducks, absent for many years. Money will also go to acquire certain marshes, by lease or purchase, for a similar purpose, together with the promotion of other allied interests, made at the expense of unsuspecting individuals and the makers of sporting necessities who have contributed generously, expecting a return from their investment. All this goes on in spite of the fact that it has long been established by competent authority that the present plight of North American waterfowl has not resulted from lack of water or insufficient breeding terrain in and about the prairie country of western Canada, which Ducks Unlimited (Canada and U. S. A.) wish us to believe in support of their doctrine. The present situation is the result of indiscriminate slaughter regardless of the consequences. There is, at the moment, and, no doubt, always will be, sufficient water and cover in the Canadian north and near north beyond the arid prairies. It is there that the majority of waterfowl breed, and to reestablish a reasonable population of all species, they need only to be given reasonable protection from the gun for a few years.

The premise of Ducks Unlimited (Canada), and the mother organization in the United States, that the main breeding grounds of ducks are centred in and about the prairie country of western Canada, now devoted to agriculture, is, therefore, as incorrect as their belief that the acquisition of marshes and the restoration and maintenance of water levels in shallow prairie lakes will rescue ducks and other waterfowl from the brink of oblivion, millions



POURING IT DOWN A RAT HOLE

of sportsmen annually taking an excessive toll. Meanwhile, as long as an interested public, non-hunting and otherwise, can be convinced by ballyhoo and persuasive propaganda that the activities and ill-considered theories of Ducks Unlimited (Canada and U. S. A.), or any organization with similar views, can assure the reestablishment of former populations in the face of persistent legalized slaughter, ducks, and other water-loving birds of recreational value to the sportsman, will continue to decrease.

One may also justly criticize the three governments of the prairie provinces of Canada for permitting an organization of laymen, untutored in the art of economic biology, to interfere with the management of their affairs in the wildlife field. One may question their unconcern regarding the dissemination of propaganda subversive to the ideals of scientific conservation, including an unwarranted demand for intensive "vermin" control that has no place in the agenda of any constructive conservation program. And what applies to the three governments of the prairie provinces of Canada equally applies to certain local governments in the United States.

In order fully to understand the fallacy of the aspirations of Ducks Unlimited (Canada), and its parent body, apart from the belief that the sportsmen of North America through these efforts can have their cake and eat it too, one must turn back the hands of time three decades

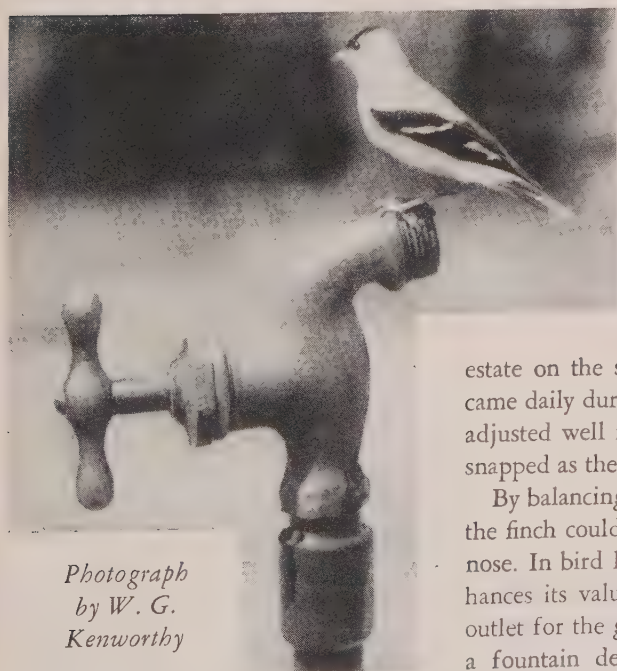
or more and survey the prairies of western Canada before the advent of agriculture. It was the pot-holes and rush-lined sloughs surrounded by a sea of grass that bred the prairie ducks of yesteryear, which now abide elsewhere. Pot-holes and grass-lined sloughs were a part of the old western scene and were destroyed by the plow. The hand of man can never resurrect them. And as for the shallow lakes, their only value in the old days was as resting places during migration to and from the north, and, in seasons of scant precipitation and unusual heat, points of concentration for local ducks where, much too often, thousands met their death poisoned by water whose saline content, common to most prairie lakes, reached a high degree of saturation. Elsewhere in the treed areas on the fringe of the prairie country, the restoration and maintenance of water levels is similarly of no consequence in view of the fact that no surface water problem exists anywhere in Canada, except on the arid prairies—the Dust Bowl of the North—to hinder the production of ducks and other waterfowl. And because of this, one is led to believe, without imagination, that Ducks Unlimited (Canada and U. S. A.) are not so much concerned with the restoration of waterfowl populations as the possibility of securing new shooting grounds along the migratory flyways, within easy reach of civilization, to offset deficiencies elsewhere. In other words, restoration to them is a secondary consideration.

One may go even further in the analysis of the theories of these organizations. From where, for instance, do they expect to conjure the parent stock to repopulate for breeding purposes the empty lakes and marshes restored by their efforts? By what trick of legerdemain is it possible to secure the necessary birds except by inducing an exodus from northern breeding areas, a maneuver that, even if

successful, will not increase the population status by a single pair. Redistribution is not restoration, although it has merit as a medium of deceit. It is something that will give the impression of added numbers, which do not exist, to justify demand for unrestricted destruction and give weight to such a scheme.

But, as one would expect, Ducks Unlimited (Canada and U. S. A.) have neglected to analyze the substance of many truths of biological importance. Among other things, they have overlooked the true significance of their recent explanation regarding an increase of ducks and geese to the number of 8,100,000 above a population census taken in 1935. They state the reason for the difference was the absence of many disgusted hunters from the favorite shooting grounds, occasioned by insufficient birds to provide a "reasonable" bag, hunters who, no doubt, will again be in evidence when they hear the good news. Ducks Unlimited therefore admits that protection from the gun has been responsible for an increase in the duck population without the assistance of their carefully formulated plan, which every conservationist has known would occur in accordance with the rules of simple arithmetic.

By and large, the theories and schemes of Ducks Unlimited are a superfluous gesture, destructive rather than constructive as far as the conservation of ducks and other waterfowl with gunning possibilities is concerned. The waterfowl population of North America can be trebled in five years by natural means, if shooting is prohibited. In ten years it could be restored to the approximate level of the days when sportsmen were few and their demands considerate. As it is, we can expect little from an organized minority who apparently believe, contrary to reason, that it is possible to keep one's cake, yet eat the last crumbs.



*Photograph
by W. G.
Kenworthy*

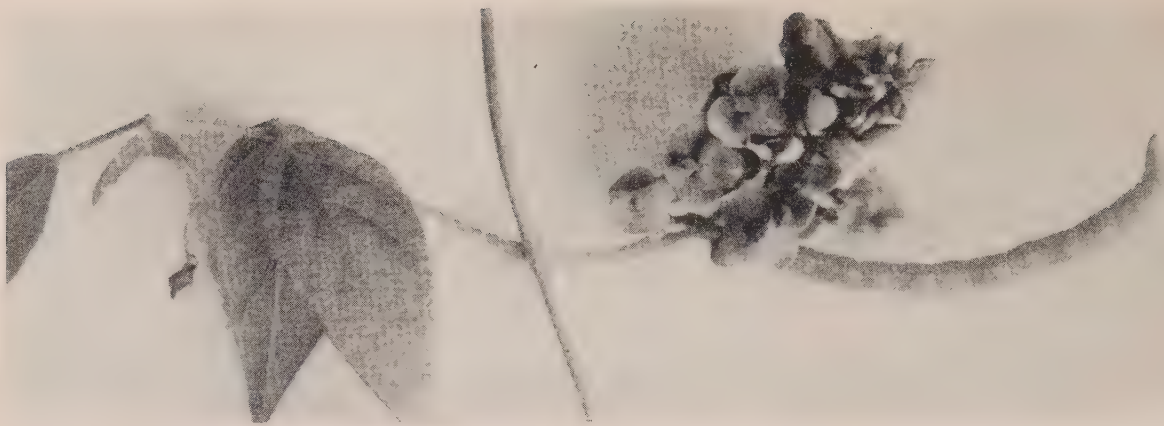
ON TAP!

By MARGARET W. WHITE

WITH thirty miles of lake water, numerous bird pools, to say nothing of countless brooks and ponds to choose from, this American goldfinch seemed to prefer his drinks "on tap".

This picture was taken in the garden of a mountain estate on the shores of Lake George in the Adirondacks, where the bird came daily during the summer months to quench his thirst. The camera was adjusted well in advance, and, by the use of a wire cable, the picture was snapped as the bird obligingly posed just before indulging in a wee nip.

By balancing precariously on the rim of the faucet and leaning away over, the finch could reach those few choice, cold drops that lurk just within the nose. In bird life, as in the life of man, scarcity of an article evidently enhances its value, and the unusual adds pique. Thus, an ordinary, upright outlet for the garden hose is transformed, in the eyes of the goldfinch, into a fountain deluxe especially created for the benefit of local bird life.



AN ATTRACTIVE VINE THAT
MAY BE GROWN DECORATIVELY

The leaf, blossom cluster and pod of the pea-potato, *Apios tuberosa*. The blossoms are of maroon and pale brown-lilac and are delicately sweet with an odor somewhat like that of the blossoms of horse-chestnut

A STRING OF THESE WILD PEA-
POTATOES, ONE FOURTH ACTUAL SIZE

At harvest time they are found thus arranged in a row. They may be served baked or boiled and are a delicious dish. They may be gathered in the wild and propagated in the home garden. The tubers rarely exceed the size of a hen's egg, but selective breeding might possibly increase their size



A String of New Potatoes

By ROBERT SPARKS WALKER

Photographs by Wendell C. Walker

How would you like to grow a potato that, at digging time, would merely require you to reach down in the loosened earth, grasp the root, and pull all of the potatoes out at one stroke, as though they were fastened to a string? This is the habit of the wild pea-potato, or groundnut, known to botanists as *Apios tuberosa*.

Recently, I gave a dinner to a half-dozen writers. Everything on the menu was from the wild. A suitable prize was offered to the person who guessed correctly each food as it was served. Beyond the delicious wild persimmon pudding, no person guessed rightly. At this dinner, the wild pea-potatoes had been baked brown and buttered. They opened mealy and melting in the mouth. And then came a dish of the same kind that had been boiled, buttered, and thoroughly mixed. None of the common potatoes could approach this delicacy.

Left to itself in the wild state, this pea-potato, which grows from Maine southward, and as far west as South Dakota and Nebraska, chooses low damp ground, and shows a preference for overflowed grounds. For six years I have experimented and proved that it can be broken of this habit.

For the last ten years, in late October, I have been digging these wild potatoes, which grow on the banks of a ditch within three feet of a cultivated corn crop. Although they have to compete there with a veritable mob of weeds, they manage to produce a good crop, using the weeds as supports for their vines. Grown in competition with so many hungry vagrants in the vegetable world, the largest of these potatoes rarely attain a size larger than a hen's egg. By selective breeding their size probably could be materially increased.

They are curiously arranged, growing near the surface of the ground and appearing on a string that measures from one to two feet. I have been raising Irish and sweet potatoes at intervals all my life, but in digging them they never bring a thrill like that of yanking out a handful of potatoes at one pull.

In the wild state, this pea-potato vine climbs tall weeds and shrubs as high as twelve feet. For two years, however, I have experimented on the sweet potato plan of letting the vines trail over the ground without support of any kind. They grow satisfactorily, but without the abundance of flowers of those grown on supports. Of course, these are not necessary where a person cares only for the potatoes.

The flowers of this plant are exquisite, with a blossom cluster of maroon and pale brown-lilac. They make a lovely group of pea-like flowers, delicately sweet, with somewhat of a horse-chestnut odor. To grow this pea-potato for its flowers, therefore, a trellis should be used, otherwise supports

are immaterial, although the ground should be kept cultivated.

Thus far, I have propagated this vine only by planting its tubers in late winter and early spring, using from one to three tubers to the hill, and covering them about three inches deep. They send up new shoots immediately after the ground warms up in springtime. For some unknown reason, the blossoms produce few beans. When the seeds are saved, new vines may be grown from them instead of from tubers.

I have found that dry tubers are slow in germinating

in spring, and for this reason, I bury my seed tubers in early fall, or as soon as they are dug, and leave them where they will keep moist. They are quite hardy in the ground, where they retain all their vigor and plumpness, and when set out in spring, send out new shoots rapidly.

There are only two known species of this genus in this country, and both are natives of eastern United States. Beside the one described, there is *Apios priceana*, a native of Kentucky, which produces one big tuber from six to seven inches in diameter. It is a vigorous climber, and its blossoms are rose-colored.

INDIAN SUMMER IS OVER

By JEAN POST

Our Indian summer is over,
And the winds are beginning to howl;
They have blustered away the beautiful haze
And the leaves are dead on the ground.
No soft blue sky, but only clouds
Of flying white and gray;
And we'll have to wait a whole year through
'Til it's Indian summer again.

At Random

By OSCAR OSTLUND

Diamonds on the fingers look inert and flat after you have seen a stream's jewelry in motion. A fluted stone in the ripples fashions a pearl that cannot be duplicated at Tiffany's.

• • •

Schools are inclined to make an invalid of Euclid by keeping him indoors too much. It takes the light of the sun, the moon and the stars to make the geometric angle vital and eventful.

• • •

The Earth's text is as divinely inspired as any in the Scriptures. A fossil is the Creator's word inscribed on stone. It is free of human fingerprints; untouched by the personality of a human scribe.

• • •

Once upon a time, where the country begins, there was a billboard on a vacant field. It looked out on a national highway and the chicory began to bloom—unbusinesslike

—in front of it. The flowers, about a foot in height, did not obstruct the billboard, but their clean, expressive blueness must have caught the advertiser's eye, and he must have concluded that the flowers had more to say than the billboard. And so he put the rivals out of the way. The chicory was mowed down, leaving stubble on the vacant field, and flowers, wilting below the sign.

• • •

The Creator reveals himself in a dewdrop more openly than he does in a cathedral.

• • •

Science and Religion have a common Polaris and motivation, insofar as they elevate men above a framework of thoughts that are personal and egotistic. The telescope, as well as the Bible, delivers us from the shadows that are cast by close-up things, by "local" points-of-view. The astronomer knows that the sun never sets a million miles out from the Earth.

American Eagle Revolutionists

Michigan pair build nest on ground in face of family precedent

By GRACE V. SHARRITT

Photographs by Fessenden

UP IN Crawford County, Michigan, this year, near the banks of the Au Sable River, a pair of white-headed or American eagles turned revolutionists. Perhaps they decided that as long as the world of humans was in a topsy turvy whirl, they might as well succumb to the jitter-bug age also, and give the bird kingdom a good controversial swing. And they have succeeded beyond their wildest expectancy! For these American bald eagles are the strangest nesting pair ever recorded in Michigan scientific history. In fact, they're nation-wide ornithology headlines!

Instead of building their aerie according to custom on a high majestic tree or mountain crag, suitable to the ancestral background of our king of birds, this satirically-minded eagle couple, without approval of F.H.A. or the A.O.U., laid their nursery of sticks and marsh grass trimmings on the burnt-over plain of a pine forest. True, they picked a site on a knoll near a young jack-pine. Nevertheless, Mamma had her feet on the earth and not in the clouds when she went about the serious business of bringing her brood into this life.

It all came to the attention of the outside world when one May morning a roving Waltonian in search of a little quiet fishing almost stumbled over the nest on the ground. When he discovered the crouching mother sourly eyeing him with a baleful gleam, the fisherman, almost scared out of his boots, hot-footed it for home, broadcasting the startling news along the way. Within a week the curious were making a trail through the sweet-fern on the wind-swept pine plain to the bald eagle's door.

As often happens when man interferes with Nature's plan, one of the two eaglets died from exposure and hunger caused by the crowds milling about their parentless home (Mom and Dad abandoned them to the curiosity seekers) before the State Conservation Department of Michigan could step in to protect the infants from the unhealthy publicity. When the department closed the roads to the famous nursery, the parents returned to care for their one remaining fledgling, with the help of Roy Davis, appointed by the Conservation Department to act as personal orderly and companion to the eaglet. Davis promptly named his ward "George" when he banded the bird for the records of United States Biological Survey.



"GEORGE" AT THE AGE OF TWO MONTHS

His was a strange existence, at odds with all the precepts of ornithology and eagledom

On May 31, so Mr. Davis told us, "George," although he was only eleven days old, and could neither walk nor fly, decided he had seen enough of his modern-era home, and scrambled away to find a less notorious roost. He made the hundred feet to seclusion in a small grove of poplars by slowly wobbling, then resting, and finally rolling until he found security in a hollow of grasses. With shrieks of encouragement from his parents winging above him George finally found peace, or as much peace as any eaglet could find who had been doomed to swaddling clothes on the sod instead of a cradle near the stars.

In the protecting shade of the leafy poplars Mom and Dad cared for their youngster by remote control. They taught George, in eagle language, the alphabet of courage. On cool nights this strange pair made a loosely-woven blanket of dried grasses and carefully covered their downy darling.

Once or twice a day, and oftener as George's appetite increased, they devotedly brought him choice suckers from the nearby river. Occasionally the breakfast might consist of delicate young loon; toothsome, half-grown rabbit; or choice duckling. But this food, Roy Davis explained from close observation, was found on George's dining table in the grove only on days that were too dark or cloudy for good sucker fishing.

In early July, when we visited George as a privileged member of the press and the Michigan Audubon Society, he was a lusty youngster with two months of ego. We noted that George had soft gray eyes, bright yellow feet,

THE NEST SITE
SELECTED BY
"GEORGE'S" FOLKS

The author and Roy Davis, appointed by the Michigan Conservation Department to prevent the curious from interfering with the young eagle's youth, inspect the spot where the pair of eagles started house-keeping. They occupied this spot for eleven days after their two young had hatched.



and a very pronounced and determined beak. He was still too young to fly, but Davis said it wouldn't be long before he would hear the sound of eaglet's wings attempting flight.

George won't be a mature national bird until he has feathered his head and tail in snowy white, which we understand will take him three bewildering years. But already his soft gray-brown feathers were pinioned and his wing spread measured approximately four feet, which showed his figure off arrogantly as he squeaked in guttural rage and fright at the camera. "George" fought every inch of the way into the edge of the sunny clearing against having his picture taken. All the while Mamma screeched admonitions at us from the sky as we took "close-ups" of her one-and-only.

Soon Dad Eagle joined her from a fishing expedition in the Au Sable and they talked us over from the bare branches of a neighboring spruce. Apparently they agreed that we meant George no harm, for they didn't attempt an attack. However, did they, in their heart of hearts, wonder if they had not betrayed their progeny when, in a fit of heady spring nonsense, they had cradled their family in the pine plain among the bluebells and wood-lilies instead of the conventional, bare branches of a high tree?

According to American eagle history, the national bird uses its nest as a permanent home-site through each succeeding year, making new additions of woven sticks and stubbles. In fact, ornithological authorities state that George's Michigan nursery of coarse twigs and rootlets on the rounded knoll near the jack-pine was mound-shaped because of several years of previous ground-nesting eagles, although the parent's radicalism towards air-dwellings was discovered only this year.

But what of George? Will he, when he has arrived at cock-maturity, seek a lady who will be agreeable to flying in the face of eagle opinion, and consent to bosom her eggs on the knoll on the plain where the field sparrow also makes a residence? Or will he, in talking the whole corny situation over with his sweetie-pie, say, "nix on the ground stuff, the sky's our limit", remembering the anxiety he caused his erratic parents during his early days?

Perhaps, since the whole cock-eyed world seems to be going to pot, George and his bride, being national emblems of these United States, will decide to go the old folks two better, and build themselves a streamlined hut among the reeds and rushes of a duck marsh, hob-nobbing merrily with the red-wings and teals. Who knows? Revolutionary modes are a by-word today, even with the birds.

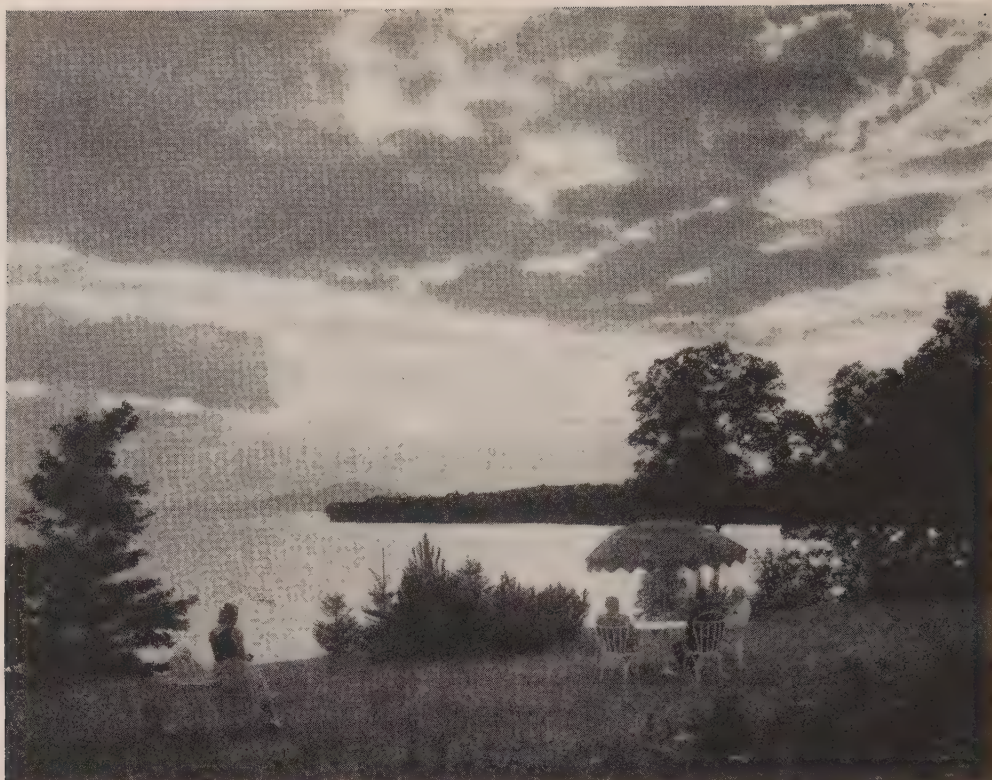
Like An Army With Banners

By PAULINE DILLINGHAM

Like an army with banners, the Autumn advances,
With proud tossing banners of scarlet and gold;
And its long shafts of light seem the glittering lances
Of trees, whose bright cohorts the mountain-sides hold.

Now the marshes wear corselets, metallically gleaming;
The long ranks of fern khaki tunics display;
All the maples' red pennants are martially streaming,
And sumacs are mustered in battle array.

Now the shriek of the wind is like wild bugles blowing;
Like drums sounds the rattle of militant rain;
For the Autumn, with arrogant triumph, is showing
That Summer is routed; is vanquished and slain.



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RANGELEY LAKE IN WESTERN MAINE

The wealth of fish life built the foundation of the popularity of Rangeley and its sister lakes. The bordering forests and marshes nourished a rich and varied aquatic fauna to support the fishes

FISH OR NO FISH

The management of ponds and lakes demands intelligence

By H. P. K. AGERSBORG

IN OUR modern life, recreation plays an important part, and no recreational pursuits surpass in interest and value those that are dependent on ponds or lakes. Unfortunately, there are large sections of our country that are practically devoid of natural lakes, and if the people of those sections are to enjoy water sports, artificial lakes must be provided. Too often such lakes have been built without proper consideration of the complex factors involved in the undertaking. The following concerns the recreational aspects of ponds and lakes, and the factors that must be considered by those who produce artificial ones, or manage nat-

ural ones, if useless expenditure of money, needless waste, and disappointment are to be avoided.

Natural ponds and lakes on natural watersheds have greater economic value than those that directly or indirectly are modified by man. The water of natural ponds is always safe for use in irrigation, processing in manufacturing plants, recreation, and in many cases for household purposes, without purification. Ponds can remain natural only so long as their watersheds remain natural, and their longevity depends on the maintenance of a natural watershed, and moderate use of their products, which, of



PHOTOGRAPH BY E. A. PREBLE

ARCHER'S POND, OSSIPEE, NEW HAMPSHIRE

This lakelet, glacier-born, has changed but little through the centuries. The oozy mud that has partially filled its bed, and the fallen trees it has received, have made possible a rich and varied biota

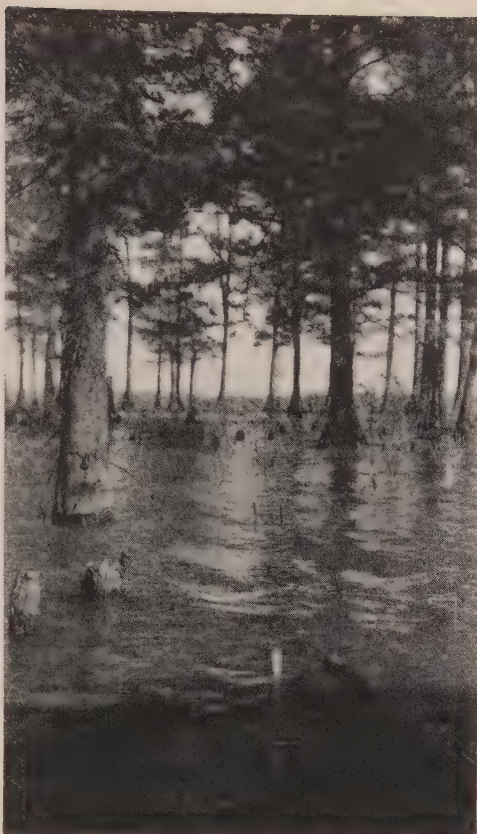
course, must be useful ones. When, in the absence of natural ponds, artificial ones must be produced, they are found to be costly and, when completed, less valuable economically if they are unable to support the well balanced life common to natural bodies of water. Their biological value varies directly with the amount and the kind of life they can support, and this depends on their possession of conditions favorable for producing abundant life of many mutually interdependent species, and the degree to which these conditions can be maintained.

To achieve balanced conditions it is necessary that the biologist and the engineer cooperate closely. For, after all, whether a lake is artificial or natural, its main values are biological in nature. Let the geologist and the engineer, therefore, build the dam, but let the biologist determine the watershed and the bottom, and the uses to be made of the water.

Heretofore, when ponds have been built, the biologist seldom has been in the picture at all.

Great losses to our people have been the consequences of this oversight. When artificial lakes are built according to biological principles in the first place, fish hatcheries will not be necessary adjuncts. The proper building of lakes insures the elimination or reduction of silting. If ponds or lakes are to be as valuable as they should be, whether built by private, Federal or State agencies, they must be constructed on certain definite biological, chemical, and physical principles. The engineer alone cannot do this.

No sooner has a pond or lake been built, whether for irrigation, manufacturing, or domestic usages, or for purely recreational purposes, bathing, boating, motoring, sailing, or swimming, than people want to fish in it. The recreational aspects of a lake, therefore, are not complete unless they include and provide for good fishing. Obviously, therefore, in planning the building of ponds or lakes for recreational purposes,



REELFOOT LAKE, TENNESSEE

The stumps and logs of the cypress forest, submerged when the earthquake formed the lake, have contributed to its productivity

the conditions necessary to meet these particular public demands must be reckoned with. Consideration of the features helpful to fish must be a part of the design.

The best way to determine the proper methods of pond construction is to go to Nature. We then find that there are many kinds of lakes or ponds, differing in size, in depth, in temperature, in source of water, in shore-line, in the nature of the bottom, and in the kind and amount of living things in them. In fact, when careful studies of a pond are made, it is found that there is a definite correlation between the nature of the bottom, the shore-line, and its inlets and outlets, and its productivity of useful life.

Natural productive ponds may be small, large, deep, shallow, fed by springs or surface streams, or any combination of these characteristics; usually they are well-covered along the shores with overhanging vegetation, or they have some shallow area inhabited by a variety of water plants. Deep ponds that are productive and

have sandy beaches usually possess also some shallow area rich in vegetation. Productive ponds having no shallow areas have instead overhanging vegetation with many pockets or holes along the shore-line. Such ponds have many hideouts and nursery nooks for fishes and their natural food. Fallen trees, large and small, are frequently found in them, and such places afford ideal situations for water insects that serve as food for fishes of all ages. Productive lakes in treeless regions are bordered by swamps or marshland that form the nurseries of the organisms

living later in the open lake. With the exception of ocean forms, relatively few creatures are born and reared in the open, unprotected, wind-and-light-swept spaces of land and water. One reason for this is that the climatic conditions of land and fresh water are more changeable than that of the wide ocean.

Productive lakes are usually those that



A RIVER LAGOON

Such places are natural nurseries for fishes, and more valuable than most of the artificial hatcheries

PHOTOGRAPHS BY THE AUTHOR

A GOOD SITE FOR AN ARTIFICIAL LAKE

When a lake is formed by overflowing a spring basin, and the terrestrial vegetation is left uncut, its wildlife values are very high. Photographs by the author



NOT GOOD FOR FISH PRODUCTION

A pretty stream, to be sure, but the constant shifting of its bottom is not conducive to the production of food and shelter for fish life



have a natural watershed. Striking exceptions are noted when a considerable part of the immediate watershed is submerged and becomes a part of the lake. The submerged vegetation of many kinds, including forest trees, gives much the same service that its watershed gives a natural lake. So long as a silting lake lasts, submerged trees provide a permanently favorable bottom, shore-lines, nesting sites for fishes, and shelter and food for the smaller organisms that they eat. The large submerged standing vegetation prolongs (within reasonable limits) the life of the lake; silting apparently has no unfavorable effect on the life of such a lake.

Feeder streams of lakes on a natural watershed deposit organic wastes in them. Such organic wastes are beneficial to all living things in the lakes. Fresh-water clams abound in such ponds and lakes. Tiny plants called diatoms, invisible to the naked eye, which are the principal food of these shellfish, are also the food of young water insects. When, therefore, one sees large and small mussels in a lake, it shows that its water has plenty of food for the young of water insects. Many species of insects pass their early stages in fresh water.

Mill ponds resemble beaver ponds in many ways. In New England many such ponds have been created on natural watersheds and they have abundant fish life. Wherever lakes have been built along similar lines by the Reclamation Service, they have given a most surprising comeback in the productivity of fish. Lake Worth, Corpus Christi Lake, and Caddo Lake, Texas, and Reelfoot Lake, Tennessee, are striking examples of what happens when many uncut trees are left in lakes with a large volume of water flowing through them. There are no better lakes for

fishing in our country today than these lakes. Perhaps most of the ponds and lakes in our country were productive two hundred years ago. But since then, the watersheds have been stripped of their vegetation, and with the loss of organic matter passing into the lakes, many have become barren. Nature, therefore, tells us this story: If we want fish-producing lakes, we must provide in such lakes plenty of nursery chambers and food for the young.

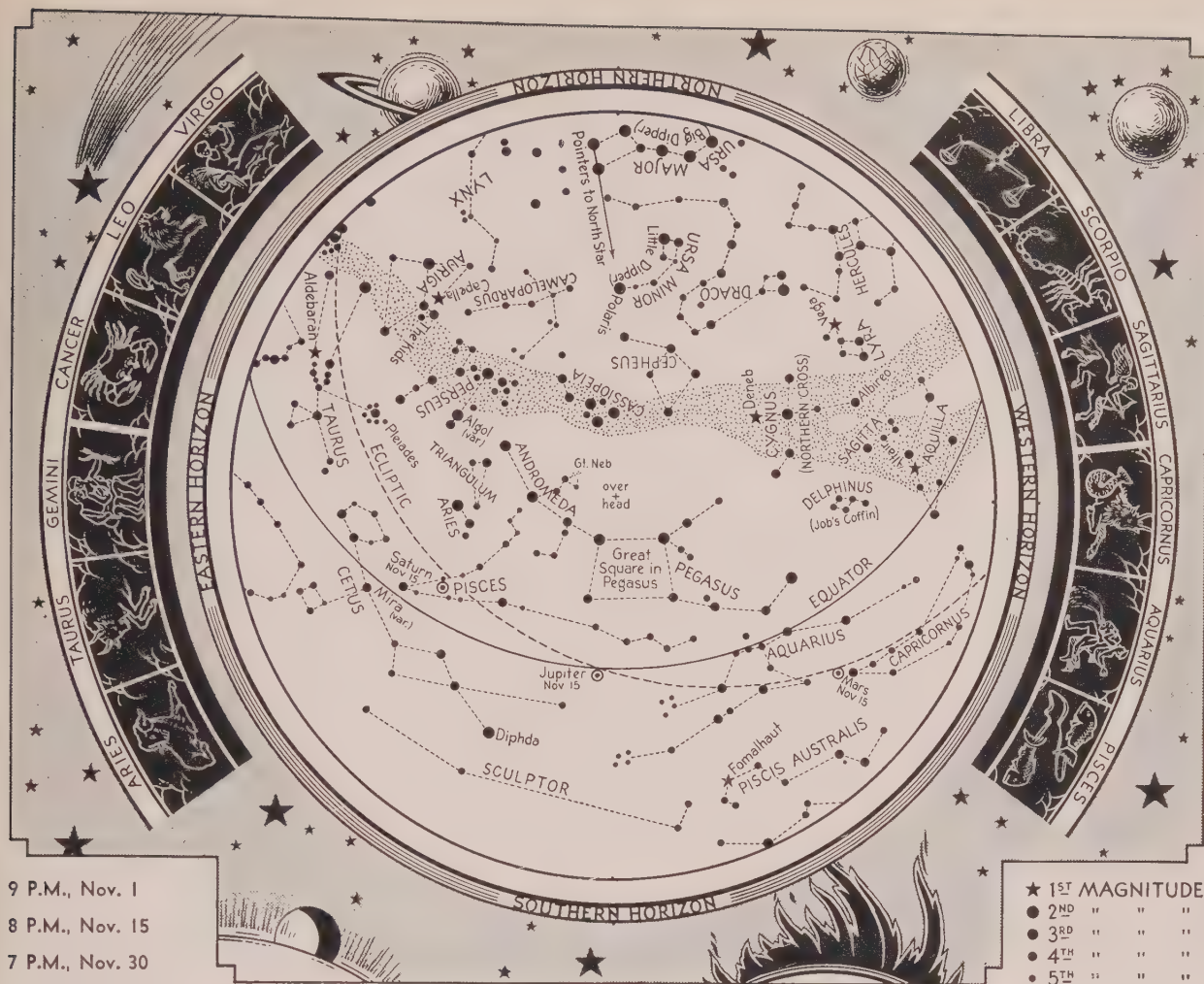
Lakes, whether deep or shallow, that are open and without shelters, and in which there is little life-supporting vegetation, and into

which flows little organic matter, dead or alive, are usually barren. To be complete recreationally, such lakes must be periodically fertilized with the organic matter necessary for minute plants and animals upon which the larger forms live, and then be stocked and restocked with fish from time to time.

When a lake is built, the type desired must be decided beforehand, and the proper plan followed. It is unwise to build on the pattern of a barren lake, and then to hope for a productive one. If the parts of the lake suitable for biological productivity must be used for purposes non-productive in fishes and their food, we must make sure that some parts of it are made biologically productive.

This problem usually can be solved satisfactorily. If the lake is large enough to be useful in various recreational ways, including fishing, definite provision for fishes must be made. In fact, a well-rounded recreational lake in which considerable fishing is to be a definite part of the recreational activities, and on which waterfowl are to thrive, must have an area of several hundred acres; it must also be departmentalized, because fish and duck-rearing cannot go on at the same places where bathing, boating, fishing, motoring, sailing, and swimming are done extensively.

It is clear that it would be more economical and more efficient to consider the fowl and fish departments of the lake in the original construction plan. Ponds that produce fish and fowl are not only more valuable, recreationally speaking, than biologically barren ponds, but they provide for healthier and cleaner ponds from the standpoint of the public weal. In a well-rounded recreational lake, the areas for fishes and fowl (Continued on page 535)



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

NOVEMBER'S EVENING SKY

By ISABEL M. LEWIS

AT THIS time of year the constellations that form what is known as "The Royal Group" may be seen at their best in the evening sky. These are, according to the ancient legend, Cepheus, King of Ethiopia; Cassiopeia, his beautiful queen; Andromeda, their unfortunate daughter. She, we may recall, was chained to the rocks to be devoured by the sea-monster, Cetus, who is rearing his ugly head in the distance. This was the punishment brought upon the royal family through the wrath of the sea-nymphs, with whom the vain Cassiopeia had dared to compare herself in beauty. Associated with the group is the hero, Perseus, who may be seen flying to the rescue of the maiden on his winged horse, Pegasus.

Cepheus and Cassiopeia sit side by side facing the pole and opposite Ursa Major. Cepheus is an inconspicuous constellation containing no stars brighter than one of the second magnitude and three of the third magnitude, but Cassiopeia is one of the most conspicuous groups in the northern sky. It has the form of the letter W, and also

crudely resembles a broken-backed chair. In fact, ancient star maps depicted the queen as sitting in a chair with uplifted arms, the chair being turned toward the pole. The preceding star in the daily motion around the pole is Beta Cassiopeia, which lies in the uplifted arm of the queen. Alpha Cassiopeia, or Schedir, as it is popularly called, is variable in brightness and marks the breast of Cassiopeia. The last of the stars that outline the W, a faint star of fourth magnitude, lies in the foot. Cassiopeia is one of the easiest constellations to identify both because of its unusual shape and because of its position in the northern sky directly across the pole from the Big Dipper, and at an equal distance from it. Like the Big Dipper, it never passes below the horizon in our latitudes and may be seen at all hours of the night. Andromeda, also, we can readily recognize by its three brilliant stars of second magnitude, lying in a straight line. Alpheratz, or Alpha Andromeda, the farthest west of the three, is in the northeast corner of the Great Square in the constellation of Pegasus. In

the constellation of Andromeda lies one of the most interesting and beautiful objects in the heavens, the Great Nebula, which is visible, even without a telescope, as a hazy cloud of light in the position indicated on the chart, although it lies at a distance from the earth so great that its light takes nearly a million years to reach us.

Perseus, which is next to Andromeda on the east and northeast, lies directly in the path of the Milky Way, as does also Cassiopeia. Its most conspicuous configuration is a long line of stars, concave toward the northeast, known as "The Segment in Perseus" and in the center of which lies its brightest star, Alpha Persei. A few degrees to the southwest of Alpha is that remarkable star, Beta Persei, or Algol, The Demon Star, which keeps a constant magnitude for about 2 days, 11 hours. Then, during the next five hours, it loses two-thirds of its light, and, in the five hours following, gradually recovers its former brightness. The cause of this loss of light is the temporary partial eclipse of the brighter star by a large, faint, companion star. The star decreases in brightness from $2\frac{1}{2}$ to $3\frac{1}{2}$ magnitude during its eclipse, which occurs with the greatest regularity at intervals of 2 days, 20 hours, 49 minutes.

Pegasus, which is one of the largest constellations in the heavens, covers a huge area in the autumn sky. Its Great Square is one of the most conspicuous configurations in the sky at this time of year. It does not belong completely to Pegasus because the star in its northeast corner is, as we have said, Alpha Andromeda, or Alpheratz. Beta Pegasi at the northwest corner of the Great Square is one of the giant red stars of the same type as Betelgeuze and comparable to it in size. It is distant from the earth about 160 light years.

The signs of approaching winter may now be read in the evening sky. As the Northern Cross in Cygnus slants toward the western horizon and Capricornus appears low in the southwest, The Pleiades and Aldebaran, the fiery eye of Taurus, The Bull, in the V that marks the Hyades, appear well up in the eastern sky. Orion which has been missing from the evening sky since early in May will soon rise in the east. Vega in Lyra, one of the most beautiful of the first magnitude stars, which is visible in the evening from May until early winter in our latitudes, now moves into the northwestern evening sky, and Capella, in Auriga, its rival in splendor, may be seen in the northeast. These two stars, although exactly equal in brightness, are strikingly different in color. Capella is a star of the same type as our own sun and a golden yellow in hue, while Vega is one of the hydrogen type stars, bluish-white and of much higher temperature. Both stars are comparatively near stellar neighbors of ours.

Vega is about 26 light years distant and Capella is 48.

Fomalhaut, farthest south of the first magnitude stars visible in the mid-latitudes of the northern hemisphere, is now low in the southwest. It may be seen in all parts of the United States and most of Canada, although it does not rise above the southern horizon north of the 61st parallel of latitude. Because it is so far south it is visible for only three months, or so, in the fall and early winter. The constellation of Piscis Australis, The Southern Fish, is an inconspicuous constellation lying south of Capricornus and Aquarius, and Fomalhaut is the only bright star it contains. This star is white in color and at the same distance from the earth as Vega.

In November all of the five planets that are visible to the naked eye will be in the evening sky although, of course, for most of this time Mercury will be too close to the sun to be seen. This planet reaches its greatest eastern elongation on November 7, but the fall elongations are not favorable ones for observation of the planet in the evening because the ecliptic, near which the orbit of the planet lies, then makes only a small angle with the horizon. At this elongation it will set about 30 minutes after the sun and one will be fortunate to see it at all at that time. It will be in inferior conjunction with the sun on November 28.

Venus is still low in the west at sunset and sets less than an hour after the sun. It is in conjunction with the thin crescent moon on November 12, and about nine hours later on the same day Mercury will be in conjunction with the moon. The two planets will be in conjunction on November 18. Venus, because of its exceptional brilliance, will be visible even when one will have difficulty in finding Mercury. At the time of conjunction Mercury will be about $1\frac{1}{2}$ degrees south of Venus.

Mars will be in quadrature with the sun on November 29, at which time it will be ninety degrees east of the sun and on the meridian due south at sunset. The planet is now receding from the earth and decreases noticeably in brightness during the month. By the end of November it will be of the same brightness as Vega. It will pass from Capricornus into Aquarius during the month.

Jupiter is a brilliant object visible most of the night in Pisces. On November 25 it is at a stationary point in its orbit, and after that commences to move eastward, or retrograde among the stars.

Saturn is now well-placed for observation in Pisces a few degrees to the northeast of Jupiter and also is in view most of the night. It also is moving eastward among the stars at this time. Watch for the Leonid meteors this month after midnight on November 15.

FRIENDS

By LALIA MITCHELL THORNTON

I am not poor—my garden has more gold
Than all the banks of all the world could hold;
I am not friendless—visitors each day
Eat of my food, and singing fly away.



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AMERICAN NATURE ASSOCIATION
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FISH OR NO FISH

(Continued from page 532)

should be located at the head of the lake, and the bathing beach beside or near the dam.

Standing dead trees in part of a recreational lake are highly valuable. But such places, to be most valuable for fish and ducks, must be an impenetrable jungle. Single big trees in shallow water do not do much good. Obviously such situations are not suitable for the bathing, boating and swimming area. Standing and fallen, decaying trees in a lake form the best sort of hideouts for fishes and ducklings. The decaying vegetation on the bottom forms a source of sustenance for fish food, and all submerged twigs and tree trunks are additional life-producing areas. The farther away from shore these are, the longer is the reproductive season of the lake; the greater the volume of water flowing through the lake, the greater may be the mass of twigs and tree trunks present that will serve to prolong its productivity. The soaked adjacent meadows of the newly formed lake become swamps, supporting their attendant flora and fauna. Communities of plants and animals of many kinds develop, some submerged, and some adjacent to water. All the dead stuff is life-giving. There exist all grades of density of water to which the corresponding types of water plants and animals are adjusted. A gradual change from a diverse to a more uniformly balanced condition follows. The more abundant the useful food-stuff, and the less the silting taking place, the longer will last the series of interdependent life of all kinds common to lakes. In cases of considerable silting, as for example, in Reelfoot Lake, the presence of standing dead trees provides conditions still suitable for water worms, immature insects, and others useful for fish forms—those that cannot live in deep, soft mud.

However, the number of standing dead trees to be left in a lake or pond must depend on its size, and on the volume of water that flows through it. In a large lake, with a large volume of water flowing through it, there is always some suitable situation, for example, along the channel, for native species of water plants and animals. Sooner or later the excess of plant proteins and other terrestrial products will be washed away, providing in a relatively short time a new lake with many possibilities of self-perpetuation of useful species of high economic value, as well as a well-rounded recreational place.

In a perfectly clean lake or pond, there is nothing but water; in a cleaned-up forest, there is nothing but air and commercial trees or their ashes; Man lives not on air, lumber and water only, but on twigs, mud, and their fruits, the remains and products of other beings, these in turn being kept alive by the unseen things of the depths.

A Green Planarian

"In some investigations of stream organisms in New York State last summer," writes Sibyl A. Hausman of Connecticut College's Department of Zoology, "I found what I believe to be unusual among planarians, those brown, easy gliders under the stones of stream beds. A light green, almost transparent flatworm was a new one to me, and its appearance was striking against the brown herbaceous slime of a stream bed stone."

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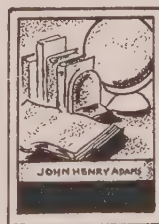
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CAMERA TRAILS

(Continued from page 483)

should be short enough and strong enough to fire the shutter. The disc should have smooth edges and be large enough to extend the plunger fully when it is slipped between the shoulders of the base and the plunger. We soldered a loop of copper wire to a disc, but a washer of the right size would do as well.

In operation, a thread is tied to the disc and run to our hiding place, the disc is slipped between the two shoulders, and the plunger screwed into the cable release socket of the shutter. Then the shutter is set, the camera focused on the desired place and we are ready to await our victim. When he appears a slight tug on the thread pulls the disc out, releasing the plunger and tripping the shutter—and we have our picture.

In the illustration, we show the gadget in use with a Kalart synchronizer, as we generally use it, but it works equally well with the camera alone.

This and That

Two Eastman Kodak items are of real interest to all of us—the Ciné Kodak Exposure Chart for Kodachrome, which will be invaluable for users of still cameras as well, and which may be obtained from your local Kodak dealer for ten cents; and the new Precision Enlarger, which takes negatives up to $2\frac{1}{4} \times 3\frac{1}{4}$ " and is very reasonably priced for an instrument of such quality. Information on the Precision Enlarger may be obtained from the Eastman Kodak Company, Rochester, New York. Please don't forget to mention this department.

Accurate focusing of your enlarger will be made easier by the new, improved See-Sharp, a reflecting gadget that makes out-of-focus enlargements almost impossible. A circular describing the See-Sharp and the other convenient dark-room equipment made by the same company, will be sent on request to Nature readers who write to the R. P. Cargille Company, 118 Liberty Street, New York City.

Have you started your Christmas cards yet?

Movie addicts will want the 16-page booklet, *Better Outlines for Your Home Movies*, which describes the effects we can achieve with the Besbee movie accessories. It will be mailed on request to Camera Trails readers by Willoughby Inc., 110 West 32nd Street, New York City.

When using a filter, remember that over-exposure will lessen its effect. The minimum exposure that will give enough shadow detail will show the greatest difference between sky and clouds.

Photographers who are interested in portraiture—and who is not?—will want to see the new "Agfalite", a portable home-lighting outfit that folds compactly and yet is sturdy and big enough to be efficient in action. If your Agfa dealer cannot show it to you, write for information to Agfa Ansco Corporation, Binghamton, New York, and mention this department.

A good watch is a necessity for the photographer and one with a large second hand or equipped as a stop-watch is especially valuable in both the field and the dark-room. The Aristo Import Company of 630 Fifth Avenue, New York City, have just announced sweeping reductions in the prices of their well-known chronometers and will send descriptive material to any Nature readers who request it. Please mention this department.

A stainless steel pocket slide rule that furnishes a tremendous quantity of lens data and most of the conversion tables needed in the dark-room, the Hyde Optical Slide Rule, has been introduced by Henry Herbert of 485 Fifth Avenue, New York City, at \$1.50. If your dealer does not have it in stock, write to the above company for your rule, or information about it, mentioning this department.

Burke and James, Inc., of 223 West Madison Street, Chicago, have added a Wall Type model to the line of Solar enlargers announced here some time ago, and have issued a new circular showing the entire group of enlargers and accessories. A note to the above company mentioning this department will bring you the full information.

HURRY! HURRY! The time to get your prints in for the first month of the 1940 contest is short. November 15th is the deadline for the January winners.

Camera Trails is edited for the readers of Nature Magazine who are interested in photography and who wish to get the greatest benefit from their picture making. It maintains a service to render assistance with any photographic problems and invites you to use this service as much as you wish. We would also like to have your comments and suggestions as to the contents of Camera Trails and the subjects covered in its columns. Address your communications to Norris W. Harkness, Camera Trails, Nature Magazine, 1214 Sixteenth Street N. W., Washington, D. C.

Film Strips

In announcing the award of a contract for the 1939-40 fiscal year, the Extension Service of the United States Department of Agriculture calls attention to the availability of film strips for educational work. Write to the Service in Washington, D. C., for a price list.

INDOORS AND OUT

(Continued from page 487)

only a score or so known copies) and its large number of descriptions of new species (109). Only a few of the books were ever distributed; one source says 90, another 70, and others believe the number was even smaller. Peale did not order extra author's copies of his volume as did the writers of other volumes in the reports. Some sources further attribute the shortage to a recall of the books because of disagreements among the editorial staff. Others attribute it solely to the great fire in the Library of Congress. Certain it is that the fire did occur and that few people ever saw Peale's book. It is certain also that one who did see the book—the renowned ornithologist, John Cassin—severely criticized its ornithology and finally prevailed on the authorities to permit him to rewrite the book and publish his work in 1858. Peale's difficulties seem, however, to have antedated the publication of his report. Albert C. Peale, a relative, said in a paper read before the Philosophical Society of Washington in 1901: "When he prepared his volume . . . he was denied the opportunity of consulting his collections." The atlas, for which 84 colored plates by Peale are listed in his work, was not published, though many of the plates are among the 42 in the atlas that accompanied Cassin's volume. One of the leading ornithologists of today has told me that in more recent years scientists have upheld Peale's conclusions to the later discredit of Cassin, and others have expressed the opinion that Peale was the victim of unfortunate circumstances. He was, however, somewhat discredited among his contemporaries, and it may have been this that ended his career as an active naturalist. He lived until March 13, 1885, but aside from a few short contributions to the Smithsonian Institution annual reports and the continuation of his butterfly collection, there are no evidences of any great activity in natural history.

From 1849 to 1872 Peale was an examiner in the United States Patent Office, where he was promoted to principal examiner in the Division of Fine Arts and Photography. He had mechanical genius and has received some credit for developments in photography. Witmer Stone said that he was "one of the first amateur photographers of this country and made many photographs of great historic value." After leaving the Patent Office he devoted his time to preparing a never-published work on butterflies.

I have had the good fortune to see a copy of Peale's *Mammalia and Ornithology* and many of his very competent illustrations—in Say's *Entomology*, in Bonaparte's *Ornithology*, in the atlas to Cassin's report, and in a bound volume of original sketches of insects in the United States Department of Agriculture library. His color plate of the wild turkey in Bonaparte's *Ornithology* seems to me to rank with the best work of its kind in his time. The plate of the stormy petrel in Cassin's atlas also is pleasing, not only for the illustration of the bird flying over water but also for the background. I have been much interested and profited by these excursions into what seems to have become a buried treasure of the nineteenth century. I am sorry that the results of Titian Ramsay Peale's work are not available to more people who are interested in the history of natural history. If they were, I believe that this forgotten naturalist would be more appreciated.

Diana Thomas's

DOG COLUMN



GROOMING YOUR DOG

EXERCISING your dog cannot be overdone (as far as the dog is concerned) but too much enthusiasm can be put into the bathing of him, with unfortunate consequences.

Over-bathing your dog, in addition to exposing him to unnecessary risks of chills and "colds," does not permit the natural oils of the skin to function properly in the preservation of the coat. A dry skin does not lend beauty to a dog's coat. Most dogs should be bathed about twice a month, under ordinary conditions. On the other hand, a *daily* "grooming" is essential.

By grooming is meant a thorough application of the brush and the comb to the long-haired varieties, and an equally thorough rubbing with a rough hand-glove to the short-haired. This is hard work, but there is a good deal of hard work entailed in the proper care of the dog, just as there is with the horse; and any hard work, if you wish, can be made fun. You will find your dog will enjoy the grooming rather more than he does the bathing. His skin will thrive under it. He will be healthy and happier, and you, yourself, won't find dog hairs around on your furniture and on your clothes. Do the job patiently, not roughly. If you are rough, don't blame him if you find him shying off from your attentions.

If your dog suffers from a skin irritation, never bathe him without orders from the vet, as a bath is likely to spread the trouble rather than relieve it. On the other hand, if he is suffering from parasites—fleas, ticks and others—he may need to be bathed more often than usual and bathed with some solution of a curative nature. For this consult your vet.

When you bathe your dog, don't comb him until he is thoroughly dry. Give him as long as may be necessary to dry right down to his skin before you comb him, and let him have sunlight, if possible, to dry in. But do not let him roam around in the meantime where he may roll around in dust to the undoing of your good work.

After bathing be sure to rinse the animal thoroughly, by the way. Have the clean, warm water handy to your hand in a bucket. If not, the dog will jump out of his tub while your back is turned. When bathing your dog, an assistant is useful. Often one is necessary—but he or she must not be a "back-seat driver." Place a thick layer of dry newspapers, or wrapping paper, on the floor for the dog when you lift him out of the bath (if indoors), after you have removed as much as possible of the water from his body. Then proceed to rub him generously with towels amply large and warm. That's the part of the bath he will enjoy. It is, also, a capital reducing exercise for you—if you need one.



Grooming the dog is not done merely for appearance' sake or for convenience. It is essential to the health of the skin. Those sleek-coated dogs you see in parks or in dog-shows did not get so without care and work. The sleekness is due to the expert attention of their owners.

Bathing and trimming of dogs may, of course, be done pro- (Continued on page 540)

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THE SCHOOL PAGE

★★★

EDITED BY DR. E. LAURENCE PALMER

Professor of Rural Education, Cornell University, and Director of
Nature Education, The American Nature Association

BEFORE HIS TIME

By John C. Birdlebough

If one were browsing in a library today, looking for suggestions for the teaching of Nature Study, he would be likely to give but scant attention to *Nature Study for Common Schools* by Wilbur S. Jackman, published in 1892. There are no illustrations, the format is unattractive, and unless the browser were more than usually thorough he would be likely to shelve the volume immediately and turn to "newer stuff." Were he a little less superficial he would find here not only up-to-date principles for the teaching of science, but also the underlying philosophy of much that is called new and modern in education in general.

Jackman says in the preface:

"Science teaching for a few years past has been gradually working itself down from the colleges and high schools into those of lower grades, but, in most cases, the plans followed . . . have been but poorly adapted to the needs of beginners. The plan here adopted is based upon what is believed to be the proper interpretation of the character of the knowledge that the child can acquire. This knowledge may be characterized as having great breadth but little depth."

In the next paragraph he lays the foundation for the theory of major concepts in science by presenting a chart to show that "Life and its Phenomena, an Expression of Energy acting through Matter, Manifests in Animal and Plant the Study comprehended in Biology (Zoology and Botany), Physics, Chemistry, Meteorology, Astronomy, Geography, Geology and Mineralogy." It is perhaps unfortunate that he uses the headings for the traditional divisions of the natural sciences, but it is far from true that he conceived them as separate entities, as will be brought out later in this article.

Under "The Motive," the next chapter heading, he writes:

"The life, health, and happiness of the individual is dependent upon his knowledge of the things about him, and upon the understanding that he has of their relations to each other and to himself. This knowledge . . . of relations can only be acquired by *actual personal contact and experience* with the things and forces which make up and govern the universe.

. . . The avenues through which the elements of the concept must be gained are the senses, and therefore the very essence of science work, upon whatever plan conducted, must be *direct, individual observation*."

Further, Jackman did not consider mere observation enough; there must be interpretation of that which is seen, for through interpretation the pupil develops self-reliance, independence of thought, and strength of character.

No doubt superstition was rife among the teachers of that day, for Jackman was launching out against the supposed occult powers of the seventh son of the seventh son, and was ridiculing those who never begin anything on Friday and those who plant seeds only in

the light of the moon.

New York State now has a syllabus for teaching the humane treatment of animals and birds, but Jackman had one in his book in 1892. He writes:

"It is hardly an exaggeration to say that not one person in a thousand meets one thing in a thousand which would do him the least harm. On the other hand, how many that are thoughtlessly destroyed do incalculable good?"

Summing up, Jackman justifies the teaching of science in these words:

"The final motive for the study of science is to bring the pupil by degrees to a strong personal realization that he is the focus of innumerable forces about him, which so bear upon him and limit his life and comfort, as to render the knowledge of how they may be resisted, guided and controlled an absolute necessity."

In Chapter II, entitled "Principles," his opening sentence is:

"It is obvious that the methods of instruction adopted by the teacher in any subject should be those that suit themselves to the natural conditions of the pupil. . . . The time has come for teachers when 'a little child shall lead them.'"

"If it is perfectly safe to take the spontaneous development of the child's mind under the influence of his natural environment as a guide for instructing him . . . turn him loose for a time upon the world and give him rein. He will return by and by, in his realm a discoverer and a conqueror. He will tell of the flowers that he finds in his pathway; of the trees and of the birds which sing in their branches. He tells of the shining pebble and sparkling sand beneath his feet, and of the great clouds rolling through the heavens overhead. He has found the tiny insect in its hidden home, and the remotest star whose radiance strikes the eye. He has watched the wonderful journey of the sun from the earliest morning ray, till the last golden shaft at night, and feels anew his delight at the appearance of the silver moon. He has been startled by the lightning's flash and awed into silence by the roar of thunder. He has seen the stream winding its way to the river, now peaceful, and again as a roaring torrent tearing its banks and building bars, and he has seen the fog lifting itself from the valleys. He has been fanned by the soft winds of summer and chilled by the blasts of winter. He has tried to bathe himself in the glories of the rainbow and he has coveted the diamonds of the dew. He has been drenched by the pelting rainstorm and he has rolled himself in the blanket of snow. He has witnessed that great resurrection in spring-time, and has seen the living world grow, mature, and die, almost as he rouses himself from slumber in the morning and sinks to rest again at night. He has tested his own strength and feels something of his own possibilities and limitations. In short, the great universe of God has been spread before him and he has scanned the whole as an open page."

While scientists do not commonly indulge in bits of fine writing such as that just

quoted, and while at first reading the account may seem somewhat overdrawn, careful analysis shows that children have all the experiences listed, and more. But marvelous as the breadth of observation of the pre-school child is, Jackman points out how soon this interest flags.

"Who is responsible for it? Who, indeed, can be but the teacher? The child comes to him with an expanding soul, even as all have felt their souls expanding once, under the genial influence of nature, and the school proceeds to deliberately squeeze the life out of him with the same modes of instruction which squeezed the life out of the generations before him. He comes to the teacher with his eyes filled with a thousand pictures, but they are ignored, and he is robbed of them one by one until at last the beauty of this world fades from his sight and it is changed to a vale of tears. In the beginning of science instruction and to the end, *the fact must be recognized that the child stands at the center of the universe*, and from first to last is touched by everything in it."

Here is to be found the philosophy of the child-centered school, but what one of the educators responsible for the movement thirty years later ever read this paragraph?

In the same chapter the foundation for unit teaching is laid.

"The arrangement of the subjects so that one shall, in turn, succeed another in regular order (this not being the same in any two schools), is a device which has done the most to obscure the relations of the so-called branches of science to each other and to the child. However necessary such an arrangement may be to an advanced course, in elementary work there is not the slightest foundation for it, either in nature as it presents itself for study, or in the conditions under which the child's mind develops."

Jackman did not believe that the material which the child began to study mattered much, so long as it was something he wished to study. Therefore the immediate surroundings should be explored for material which will be studied in season, for that is the natural procedure. Yet seasonal arrangement has only recently been given emphasis in state courses of study.

The following paragraph is so pertinent to our situation today that it is quoted in full:

"The most serious obstacle in the way of science work today is the teacher's own lack of faith in his ability to do anything useful or creditable. He should without hesitation begin with the simple things around him, and grow with the pupils. The crude and scanty appliances at hand, well used, will open the way for better ones which will surely come, for, in the end, the schools are not to suffer for the lack of any really good thing."

In harmony with the above statement, Jackman suggests as a suitable form of Expression that pupils build apparatus for physics and chemistry. He says they can and will enjoy the doing. *Build apparatus*, when a school shop was practically unknown; *build apparatus*, when the standard practice was to buy of instrument makers; *build apparatus*, when the authority of the text-book was su-

preme!
 Further he suggests painting, modeling and drawing from the object as suitable modes of expression. But the appropriate mode is to be chosen, not by the teacher, but by the pupil.

"The pupil cannot express what he does not see and must express what he does see through what to him is the most natural and appropriate channel."

Here seems to be found the basis for the progressive education movement, credit for which was not given to Jackman.

Nature Study for the Common Schools could not have been very popular with the teachers of the day, for the outline of work in each field is given as a series of questions, which are not answered. There are some noteworthy features. Pupils ought to begin map study by mapping and modeling the school room, school grounds, and surroundings. The graph is introduced in connection with the study of meteorology for showing such things as the variation in the slant of the sun's rays, the variation in the length of day and night, and the mean height of the barometric column. Only within a few years has the graph been emphasized in the elementary schools of New York State.

Nothing is said about grade placement. Apparently the teacher was to be left free to select what she deemed most appropriate for her group.

To what extent was Jackman's philosophy adopted? While in the elementary grades of a city school system that advertised the munificent compensation of its teachers the author was never exposed to any science experiences. The last three years of the elementary grades were years of delight and wonder for him, for he had the privilege of sharing the elementary science program that the late C. B. Robertson was developing in the practice school of the Cortland Normal. No text-books were used, each lesson being introduced by a simple experiment. The content was largely physical science. As the year was about 1906, it is possible that the philosophy of Jackman was being applied. However, the author had never heard of Jackman and his work until he was pursuing graduate study at Cornell University in 1939.

Bibliography
 Jackman, Wilbur S., *Nature Study for the Common Schools*, Second Edition Revised. New York: Henry Holt & Co. 1892.
 Jackman, Wilbur S., *Nature Study and Related Subjects for The Common Schools. Part II: Notes*, Chicago: By the Author. 1896.

TREE SKETCHING AS A HOBBY
 (Continued from page 496)

tion to the sketcher. Old stumps and broken, gaunt skeletons of trees that I once thought sorry disfigurements of the landscape now have a certain picturesqueness. Although they have lost nearly everything that makes a tree a tree, they stand undaunted. Particularly inspiring are the broken trees that have put out new branches. They may lack much of their former glory, but they still hold up their heads among their comrades.

Again, trees are of interest because of the unusual places in which they grow. Some have split rocks apart to make standing room for themselves on vertical canyon walls; others

stand alone on rocky peaks or ridges where the winds and storms of centuries have twisted them into many fantastic shapes.

Most of my drawings I leave just as I sketched them in the woods; others I like to work over into more finished form. I have done all my sketching in pencil, but I like occasionally to make drawings over in wash or ink at home. Some, in their sketchings, use water color direct, and others get pleasing results with colored crayons, or pencils, or pastels. Among the books that I have found helpful are Doust, L. A., *A Manual on Drawing Trees and Foliage*; Guptill, A. L., *Sketching and Rendering in Pencil*; Rines, Frank., *Design and Construction in Tree Drawing*; Rines, Frank., *Drawing in Lead Pencil*.

The pleasure that my more intimate acquaintance with trees has given me is slightly tinged with regret only for not having begun my sketching sooner.

Sumac for Breakfast
 By Alice B. Huff

Sumac bushes dot the hillsides in this section of North Carolina and give warmth to the scenery on wintry days. So we purposely left a clump of these bushes, mixed in with alders, by the side of the brook that winds around the foot of the hill at the side and back of our house. Some time later, on a Sunday morning in early spring, we awoke to find the ground completely covered with snow. While we were enjoying our warm breakfast, our attention was attracted to a flock of robins alighting on our sumac bushes. They seemed much excited and evidently were hungry, for they immediately began to eat the red berries as if this was a breakfast especially ordered for the occasion. Soon the berries were all picked off, leaving the stems bare and brown; then the birds fluttered about as if looking for shelter, and soon left the vicinity.

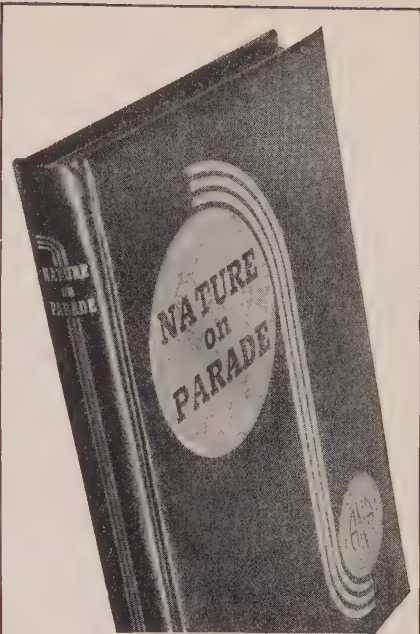
There were eighteen of them; and as it is unusual for that number to be seen here at one time, and especially so early in the season, we concluded that the group had been detained, or detoured, by the snow while en route to another section. But our sumacs still serve as a reminder of the snowy spring morning when they provided breakfast to the feathered tourists.

Carolina Frogs and Toads

Published as Leaflet No. 12 of the Charleston Museum, *Frogs and Toads of South Carolina* is the work of E. Burnham Chamberlain, curator of vertebrate zoology. The title is descriptive of the contents, and copies are available at ten cents.

A Book of Succulents

Succulents for the Amateur is a collaboration by J. R. Brown, Alain White, Boyd L. Sloane and G. W. Reynolds, with Scott E. Haselton, who arranged and edited the writings of the others. The result is a book that will be welcomed by all growers of succulent gardens or students of this field. It covers more than eight hundred succulents, and the pictures, which are beautifully reproduced, show four hundred of these. It is a book for the beginner and not for the advanced botanical student. The book is published by the Abbey Garden Press, Pasadena, California, and sells for \$1.55 in a heavy paper binding and \$2.05 in the cloth binding.



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GROOMING YOUR DOG

(Continued from page 537)

professionally for you. The average dog shop and most veterinarians provide such a service. Nails also must be given attention in all cases, and terriers require periodical clipping to accentuate the terrier points. There is no reason why you can't learn to do this, if you wish, as well as any professional. The best way to learn is to watch the professional perform the task and observe him carefully.

In New York there is a Dog's Bath Club, complete with swimming pool, recreation-room, and other luxuries. It is, I believe, the only institution of its kind in this country. There is also a Dog's Restaurant in London, possibly the only thing of its kind in the world. It's a highly entertaining affair, founded and run by an ex-army officer. It's one of the most amusing places I've ever visited.

Nature Photography

The First Annual Boston International Salon of Nature Photography will be held at the main hall of the New England Museum of Natural History, 234 Berkeley Street, Boston, Massachusetts, from February 1 to 15, 1940. It is being held under the auspices of the Society and the last day for receiving prints is December 31, 1939. Space does not permit printing all the details here, but a note to the Society at the address given above will bring all necessary information and entry blanks.

Foresters to Meet

The Thirty-ninth Annual Meeting of the Society of American Foresters will be held in San Francisco from November 23 to 25. The central theme of the meeting, which will bring together foresters and anyone interested in forestry and conservation, will be "The Next Thirty Years in Forestry." Field trips to the redwood region, lumbering operations and other places of interest are planned. Headquarters will be at the St. Francis Hotel.

Miracle Men

We had a number of things on our desk to be done when we picked up the review copy of *Modern Miracle Men* by J. D. Ratcliff to read a chapter or two. This was fatal to the waiting work for this is a book one does not want to lay down. It is a record of research in the field of medicine by doctor and chemist; a record of the progress of the past few years toward control of some of the scourges of mankind. Written in flowing style, for the layman entirely, this book tells of the drama of medical experimentation, of the months of patient research studded with disappointments and crowned with final triumphs. "More fascinating than fiction" is an overworked phrase, because the majority of current fiction is far from fascinating. Mr. Ratcliff's book ranks, in our estimation, with the half-dozen outstanding novels of the past decade that we have felt worth keeping in our library. It will, we hope, achieve the ten-best-seller list in the non-fiction class. Published by Dodd, Mead and Company, *Modern Miracle Men* is priced at three dollars.

Insect Marvels

Originally published in a two-volume edition, *Marvels of Insect Life* by Edward Step

NATURE IN PRINT

As a convenience to readers the books reviewed in this department of Nature Magazine may be ordered through the book department of the American Nature Association.

has now been brought out in a single volume edition at half the original price. With 640 illustrations, an introduction by Raymond L. Ditmars, and Mr. Step's interesting text, this is a fascinating volume. The treatment is popular and Latin names are largely eschewed except as footnotes. It is a book for the layman and one in which he will find a world of interest. The publishers are Robert M. McBride and Company and the price is \$3.75.

Very Fearsome Critters

If you have ever encountered, during your rambles in the wildwood, a Gumberoo, or, even, a Rumtufusel, you will want to have a copy of *Fearsome Critters* by H. H. Tryon. Or, it may be that you have only met the Dungavenhooter concealed behind a whiffle bush, and will wish to have this volume to learn to know this Satanic beast the better. It may also be that you have never encountered any of these creatures, or the others described in this volume, but it will not detract from your enjoyment of it. Mr. Tryon hit upon the idea of gathering stories of legendary and imaginary animals created out of the same sort of imaginations that have conceived and given substance to Paul Bunyan of the lumber camps. The result is as entertaining a book as you'll find in an hour's wandering among the bookshelves. Photographic illustration lacking (a snapshot of the Gumberoo having exploded in the developer) the book is illustrated by line drawings of the subjects in accord with the best descriptions available. Published by the Idlewild Press, Cornwall, New York, this book is a lot of fun, much more than two dollars' worth.

On Plant Names

Willard N. Clute, editor of the *American Botanist*, writer and lecturer, has brought out *A Second Book of Plant Names*, companion to his *Common Names of Plants and Their Meanings*. Following the general idea of the earlier volume, this new one makes still further excursions into this fascinating field of nomenclature and what is behind it. More than eleven hundred plant names are referred to in the book. It is published by Willard N. Clute and Company, Indianapolis, Indiana, at three dollars.

Zoology Text

Fundamentals of Zoology is the title of a new zoology text book written by Dr. William J. Tinkle, professor of biology at Taylor University. The text is prepared with recognition of the progress of biological knowledge, and each chapter is concluded with questions and problems felt by the author to be as much applicable to this subject as to other of the sciences. There is an excellent concluding chapter on conservation of wildlife. The book

is published by the Zondervan Publishing House, Grand Rapids, Michigan, at three dollars.

About Mound Builders

If your interests lie in ethnology, especially in the history of our own Indians, you will want to read *Under Your Feet* by Blanche Busey King. Even though you may not have any very active interest in these directions you will find the book fascinating. It treats with the American mound builders, bringing in those of other parts of the world only for comparative purposes. The author has come into contact with the public at one of the sites of these past peoples and has found a tremendous popular interest in them. Her book, in the preparation of which she has enjoyed the aid and criticism of some of our leading ethnologists, is an attempt to answer the thousands of questions asked her. She has succeeded beyond a doubt. The publishers are Dodd, Mead and Company and the price is \$2.50.

Indoor Hobbies

We foresee a popular reception for *The Book of Indoor Hobbies* by Emanuele Stieri. The first seven chapters of the book deal with subjects of interest to those whose hobbies are along Nature lines. These subjects are: Window-box Gardening, Roof Gardening, Terrariums, Dish Gardening, Cactuses, Aquariums, and Feathered Pets. The remaining chapters deal with Pottery, Leathercraft, Plastics, Pewtercraft, Soap Carving, Chip Carving, Etching, and Bookbinding. The material is presented in simple and practical form and is supplemented both by a bibliography and a listing of sources of materials. Altogether an excellent idea well carried out in book form. Published by Whittlesey House; the book is three dollars.

Quartz Family Minerals

In this issue we publish an article suggesting the fascinations of mineral collecting and here comes to hand a book germane to this feature. It is *Quartz Family Minerals* by H. C. Dake, Frank L. Fleener and Ben Hur Wilson. This volume is directed to the growing number of amateur mineralogists and collectors and is, in fact, a handbook for them in this interesting field of quartz minerals. This is a particularly popular group with collectors. The book is published by Whittlesey House at \$2.50.

Nature References

Key to the Out-of-Doors is the title that Richard James Hurley gives to his book, which is a bibliography of Nature books and materials. This volume is almost indispensable to anyone working in Nature study or in natural science, whether in schools or otherwise. Mr. Hurley has done a real service in assembling and classifying the hundreds of references in this book. The book is published by the H. W. Wilson Company at two dollars.

New Nursery List

Compiling a New Nursery List is an excellent 96-page book by L. C. Chadwick of value to anyone planning tree and shrub plantings. It is available for forty cents from the American Nurseryman Publishing Company, 508 S. Dearborn Street, Chicago.

Sacajawea, the Bird Lady

We have received from the director of Girl Scout work at San Diego, California, a note about the outstanding Nature work contributed to the San Diego County Scout camp by Kathryn Hunter, and a request that we tell others about her work. This is a bit unusual, but it is patent that this Nature program merits wider publicity and that its leader is equally deserving of recognition. So, without change, we print this item, which is entitled "The Challenge of the Cardinal", and which says:

"Tapawingo", the Girl Scout camp of San Diego County, located in the pine-wooded Cuyamaca mountains, is the 'Place of Joy' for girls not only of California but of the entire United States. By selecting counselors from every state in the union, only the very best are secured. The camp is noted for its historic background, and its many outdoor activities. The most striking feature in the Nature program is that of bird calling by Kathryn Hunter, who because of her knowledge of Nature lore and her ability to interpret and imitate bird voices, is known at Tapawingo as Sacajawea, the bird woman.

"Along the Nature trails at Tapawingo, Sacajawea points out the interesting secrets of plant, animal, and insect life. Collections are made for aquariums, and flowers and butterflies are studied and mounted in 'Nature Nook'. In the afternoon, star maps are made, then at twilight the Nature trails lead to the study of constellations.

"Kathryn Hunter's childhood days were spent on a Kansas farm, where she learned to recognize the yellow warbler, the orchard oriole, the brown thrasher, the wood thrush, and many others. One of her early memories is of the cardinal that accompanied her on her long walks to school. It was his beautiful song that inspired this country girl to imitate his cheerful song. The challenge was answered and she became known throughout the midwest as 'The American Nightingale'. Over a period of years, she has become an expert in calling and imitating her feathered friends. Sacajawea has become so well known that Cecil B. DeMille, producer of Paramount Pictures, learned through Disney of her unusual ability and selected her bird interpretation for the picture, 'The Buccaneer'. She has extensively entertained schools, commercial clubs, women's clubs, and has been the guest artist at the Governor's banquets, over the radio, and on the stage throughout the Pacific coast, middle west, and Florida. Her aim now is to give that pleasure, which has come to her through her association with birds and the outdoors, to the Youth of America."

Texas Birds

The Stillwells of Dallas, Texas, are busy people. We have had occasion to record this fact a number of times and are glad to give further evidence with acknowledgement of receipt of *Check List of Birds of Dallas County, Texas*. This is the work of Jerry E. Stillwell and follows on the heels of the appearance of Mrs. Stillwell's booklet on the woody plants of the same region. Brought out under the sponsorship of the Dallas Ornithological Society, this 84-page check list is available from its author at 7460 San Benito Way, Dallas, Texas, for one dollar.

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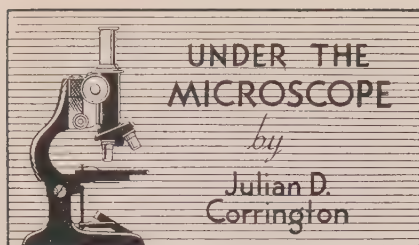
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Homemade Bullet-Comparison Photomicrographic Camera

Our regular readers will recall the splendid article in the April, 1939, issue in which was described the manufacture by Señor Arturo Borges Badell, of Santiago de Cuba, of a workable cardboard microscope, using finder lenses from an old Brownie camera to make the objective and eyepiece. Here-with Señor Badell, former Director of the Bureau of Identification of the Police Department of his city and author of a single fingerprint system, offers another project, even more valuable and interesting, since the equivalent professional apparatus is expensive, far beyond the reach of the average individual. It is his hobby to build from simple and inexpensive materials all pieces of apparatus used in his office. That his outfits will do first-class work is attested by the accompanying photomicrographs showing actual results.

It is now generally known that firearms leave characteristic markings upon their projectiles in the form of bullet scratches, firing pin impressions and ejector marks, and so complex is the detail of these when examined microscopically that no two guns will mark a bullet or cartridge in exactly the same way. Someone has called these impressions "fingerprints on bullets." The new profession of scientific crime detection leans heavily on its department of ballistics for the kind of evidence that can be demonstrated in the courtroom and bring about convictions.

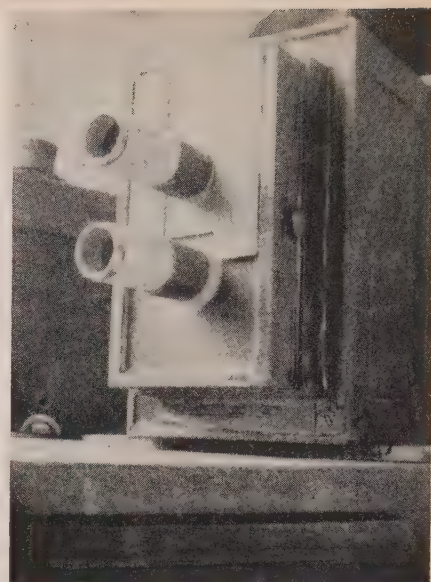
When police officials are trying to solve a homicide, one of the most important bits of evidence for which they search is the bullet or bullets removed from the body of the victim, sometimes supplemented by others from the walls or furnishings of the room, automobile or, if outdoors, from a tree. If such a bullet can be obtained it is mounted in a chuck which can be revolved so as to display all side views; then bullets fired from

guns of arrested suspects are similarly mounted and the two inspected simultaneously through the comparison microscope. If the fine striations can be lined up and made to agree, the evidence is conclusive that the homicide bullet was fired from the same gun as that found on the person of a given suspect. Such evidence will convict, and it will likewise clear innocent suspects.

The comparison microscope has two objectives but only one eyepiece. Prisms bend and direct light from each objective to the single central eyepiece so that the two separate images appear as one, the right half coming from the right objective, the left half from the other. Obviously, the two materials being examined, whether bullets, signatures, textiles, hairs, inks or any other substances of criminological importance, must be of identical nature if the resulting composite image is to appear uniform, as if produced by a single lens. If unlike in any particular or in origin, the two images will look like two different objects and not like one. For purposes of record and presentation of evidence to others, the photomicrographic camera is customarily hooked up to the comparison microscope.

Badell's apparatus lops off the major expense and difficulty at the start by dispensing entirely with the comparison eyepiece. Construction is simple and follows the general procedure explained in his earlier contribution, using cardboard and glue as the chief ingredients. Fig. 1 shows a side view of the completed camera, about 20" long and 4x5" in section. It may be made in two or more parts, to slide tightly within one another so as to act as a bellows, but this is not necessary. This box is painted dull black inside, equipped with a holder at the back for a ground glass and for plate holder or film pack adapter, and is divided horizontally from front to rear by a central partition to separate the two images from the two objectives—a two-in-one camera. The two lenses are the two larger ones from the view finders of a Brownie camera and give a magnification of about 4X.

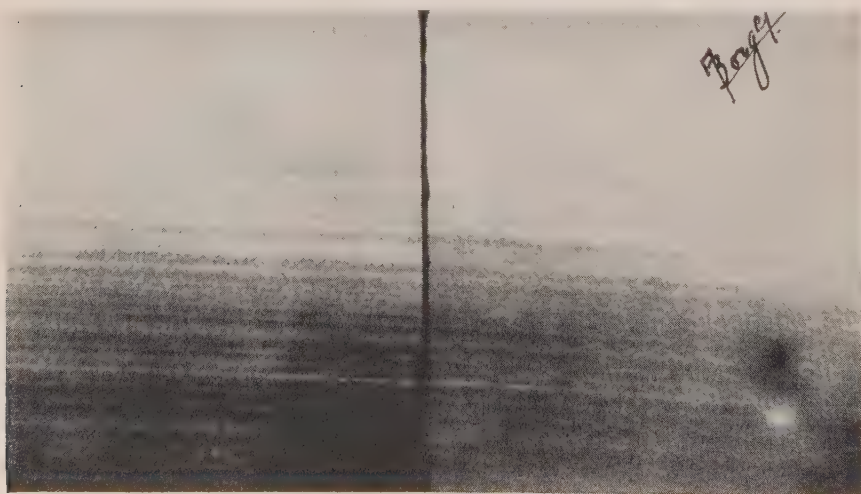
Fig. 2 provides sufficient information so that anyone can construct this apparatus; C shows the method of mounting the bullets, the lower mount enabling a rotary turning so that identical views may be obtained. Fig. 3 is a front view of the finished camera which Señor Badell first made and shows the upper objective tube in a sliding mount, nec-



FRONT VIEW OF THE UNIQUE CAMERA DEvised BY SEÑOR BADELL. FIG. 3.

essary in determining the exact distance separating the two tubes, but no longer essential now that this distance has been determined. Not shown in the drawing is a disc behind the lens in each tube, with a 2mm central hole, thus providing a diaphragm to give critical definition of images.

The outfit should be rigidly supported on a table top; also the projectile holder, after a sharp focus on the ground glass has been secured, and Señor Badell does this with rubber bands. Illumination is provided by a photoflood lamp in a tin housing, and exposures must be comparatively lengthy. To experiment with bullet identification problems, two test shots are fired into a container filled with cotton waste or batting. Bullets will travel from 7 to 10 inches through this material and may be recovered unmarked by impact. If only one object is to be photographed, a cap is placed over one of the tubes, while macrographs may be made by substituting for one tube another with a lens of longer focal length, as the main lens from a Brownie camera, and capping the remaining tube. Fig. 4 is such a macrograph, made in this manner, while Fig. 5 shows bullet scratches on two different bullets fired from the same gun, as photographed through the comparison camera. Both of these pictures



ARE THESE TWO BULLETS OR ONE? WE'LL TELL YOU. THESE ARE PHOTOGRAPHS OF THE SCRATCHES ON TWO DIFFERENT BULLETS. FIG. 5



A MACROGRAPH OF A FORTY-FIVE CALIBRE BULLET. FIG. 4.

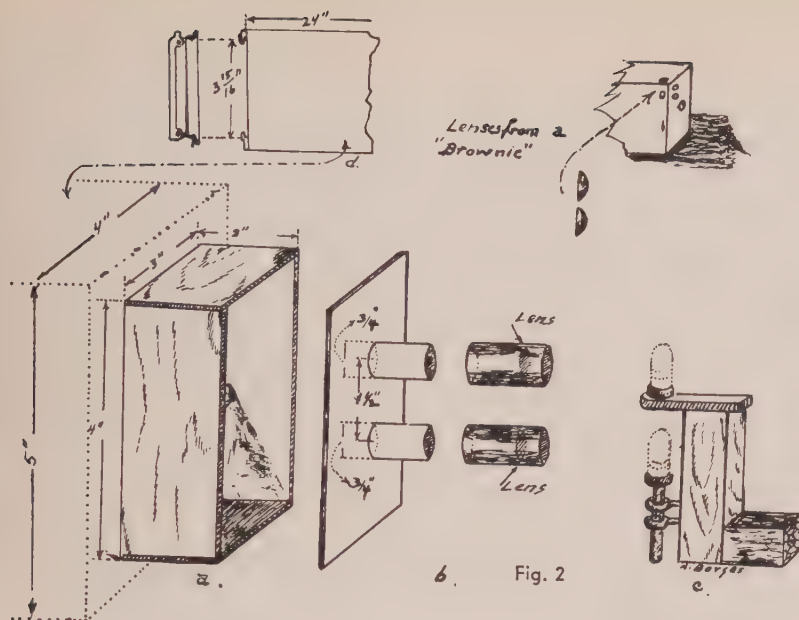


Fig. 2

ROUGH DESIGN
SHOWING CON-
STRUCTION OF
PHOTO-MIKE
CAMERA BUILT
BY OUR FRIEND
SEÑOR BADELL

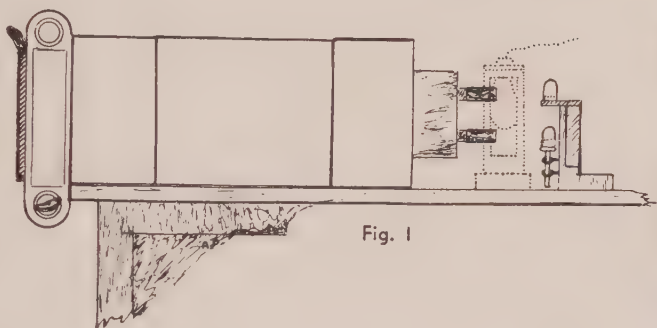


Fig. 1

were made with the outfit here described, and compare favorably with professional work using elaborate apparatus.

Ingenuous readers will readily think of many uses for this camera, bullets being only one of many objects which can be compared photographically under magnification.

Beginner's Primer

Continuing our survey of insect classification, we come to the subclass Heterometabola, including those orders of insects that undergo an incomplete metamorphosis and in which the young stages, termed nymphs, more or less resemble the adult. The chief orders placed in this subclass are the Orthoptera, Isoptera, Ephemerida, Odonata, Plecoptera, Mallophaga, Thysanoptera, Anoplura, Hemiptera, Homoptera and Dermaptera, orders widely variable as to size and importance.

Of all insect orders, none is more frequently used in microscopy than the Orthoptera (straight-wing), and accordingly attention will be concentrated on this group in the present chapter. These insects have chewing mouthparts, typically two pairs of wings, the first pair being narrow and somewhat hardened but still showing venation, the hind wings membranous and folding in plaits like a fan when at rest, the metamorphosis incomplete, the nymphs terrestrial. In some forms the wings are vestigial or lacking.

The order is divided into two suborders, of three families each, all readily recognizable even by the beginner. The Cursoria are running orthoptera, with legs more or less equally developed, fitted for walking or run-

ning and not for jumping, and without stridulating (noise-producing) organs. Here belong the walking sticks (Phasmidæ), mantids (Mantidæ), and roaches (Blattidæ). The Saltatoria, by contrast, have the hind legs much enlarged and adapted for leaping, and stridulating organs are present. Included families are the long-horned grasshoppers (Tettigoniidæ, formerly Acrididæ), short-horned grasshoppers (Locustidæ), and crickets (Gryllidæ).

American walking sticks, except for one Florida species, are elongate and wingless insects with a remarkable resemblance to a twig. Colored brown or green and remaining motionless for long periods, these slender and long-legged creatures are certainly well protected from enemies. They feed entirely upon vegetation and sometimes do serious damage to forest trees. Some exotic species carry their camouflage even further by having the wings as well as flat extensions on the legs colored and veined like green leaves.

The praying mantis is familiar to most outdoor people and is one of the few insects that make satisfactory household pets. In our own family we have every autumn one or more of these interesting fellows among the flowers of the dining table centerpiece, where he will usually remain without any restraint and eagerly seize flies offered with the fingers or a forceps. Like walking sticks, the body shape and color show amazing protective resemblance to twigs and leaves, but unlike them, mantes have wings and are strictly carnivorous. The front legs are in the form of a vise, with heavy spines, and capture and kill insect victims on the principle of a nutcracker. This leg is a standard whole mount in microscopy to demonstrate the grasping type.



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Everyone knows the cockroach, usually with a feeling of repugnance. They make most interesting creatures to study, however, being very alert and beautifully adapted for their particular modes of life. Roaches are flattened, oval, omnivorous, long-legged, swift-running insects, with long slender antennae and the mouthparts concealed beneath the headpiece. Among household species, the croton bug, *Blatella germanica*, is a small immigrant from Europe; the Oriental cockroach, *Blatta orientalis*, another foreigner, blackish-brown in color and just under an inch in length; and in the south, the large American cockroach, *Periplaneta americana*. Beneath bark and under logs and stones in our fields and woods are other smaller native species. The third leg is commonly used in slide mounts as an example of the running appendage, while the wings and antennae also make excellent mounts. Eggs are laid in peculiar purse-like capsules termed oöthecæ, and these may be mounted if pricked with a fine needle to let out air and admit xylol and balsam.

The two families of grasshoppers are distinguished by a number of features, the common names indicating one—the length of antennae. The long-horns have slender antennae, longer than the body, the tarsus has four segments, the ear (tympanum) when present is on the base of the tibia of the foreleg, and the egg-laying organ (ovipositor) of the female is sword-shaped when protruded. Typical species are bright green, delicate insects that spend their lives among the tall grasses of meadows. The katydid is the largest and best known. Mounts of the forewings (wing covers or tegmina) of the two sexes will show the presence of the elaborate stridulating or musical organ at the base in the male and its absence in the female.

Short-horned grasshoppers or locusts have stouter antennae much shorter than the body, tarsus with three joints, ovipositor short and of small separate pieces, hearing organs located on the sides of the first abdominal segment. An abundant small species is the red-legged locust, *Melanoplus femur-rubrum*, widely used in biology classes, and an excellent subject for microscopic whole mounts of wings, antennae, and hind legs, to represent the jumping type. Mouthparts are more easily dissected from a larger species.

Crickets are celebrated in poetry and are maintained by the Chinese as musical performers and for fighting. Mostly they are grasshopper-like in general form and have long antennae, ovipositor long and needle-shaped, and tarsus three-jointed, though there are exceptions to all of these rules. If you will capture a male field cricket and remove the wing covers and mount one, lower side uppermost, the microscope will reveal the musical apparatus, known as the file and scraper. The file occurs along the principal vein, while the scraper is a hardened part on the inner margin, a short distance toward the base from the main vein. When chirping, a cricket elevates these wing covers to a 45° angle and rasps the scraper of one wing along the file of the opposite wing.

A most interesting type in the cricket family is the curious mole cricket, *Gryllotalpa*, which burrows in the soil, feeding on roots and other insects, and coming forth only at night. The forelegs are remarkably adapted for digging and bear an amusing superficial resemblance to those of a mole. A mount of this leg forms a part of every slide collection to show adaptations in insect legs. It is rather

large and thick, requiring potashing and mounting in a shallow cell.

Technique for making slides was given in the September, 1937, and November, 1938, issues, while a discussion of types of insect legs and names of parts appeared in the first of these.

Offered This Month

Our offering this month will be appreciated especially by the photomike fan—the Eastman Kodak Company's 44-page booklet, *Films, Plates and Filters for Commercial Photography*. Both the novice and advanced worker will find many facts, formulae and hints of great value in this pamphlet, especially on the use of filters, so important for good results in the photography of any subject having color, including the photomicrography of stained sections and whole mounts. It is very well written and beautifully illustrated. Send a 3¢ stamp to Julian D. Corrington, Nature Magazine, 1214 Sixteenth St. N.W., Washington, D. C., and a copy will be mailed to you promptly.

American Society of Amateur Microscopists

President, Simon Henry Gage, Ithaca, N. Y.

Permanent Secretary, Julian D. Corrington, Chestertown, Md.

Official organ, *Nature Magazine*, Washington, D. C.

Address all communications concerning the Society to Dr. Corrington at Chestertown, Md. Application for Membership form sent on request. Dues, one year, fifty cents; two years, one dollar.

Attractive New Offer

So rapid and satisfactory has been the recent progress of our Society that the American Nature Association has decided to make a combination offer that is certain to be popular with our present and prospective members. Membership in the Association, including subscription to NATURE MAGAZINE as well as other privileges, is \$3.00 per year; \$3.75 foreign. Membership in the ASAM is fifty cents per year. The new offer makes both available for the price of the first alone—both renewals and new memberships in the Association, plus a membership in the ASAM will now be \$3.00 a year; \$3.75 foreign.

Such combined memberships must be sent to Dr. Julian D. Corrington, 118 Water St., Chestertown, Maryland. He will send a postcard acknowledgment, retain fifty cents for the ASAM, and remit the balance to the Washington offices of the American Nature Association. This should bring many new members into our ranks since, if they are already subscribing members of an Association Magazine, the ASAM will in the future cost them nothing. If you are among those who have already paid their 1940 ASAM dues in advance, you may deduct fifty cents in making your remittance.

Christmas and another year will be upon us shortly, so keep this in mind for yourself and as a dandy Christmas gift for the friend or relative who has or expects a microscope.

Upwards of 300 Certificates have now been mailed out to members, while Bulletin No. 1 was sent to all who had submitted questionnaires. Now Bulletin No. 2 is on the fire and, like all future publications of the Society, will be sent to members only. A number of excellent manuscripts have been received and there are promises of more, so this second issue should be very informational and worthwhile.

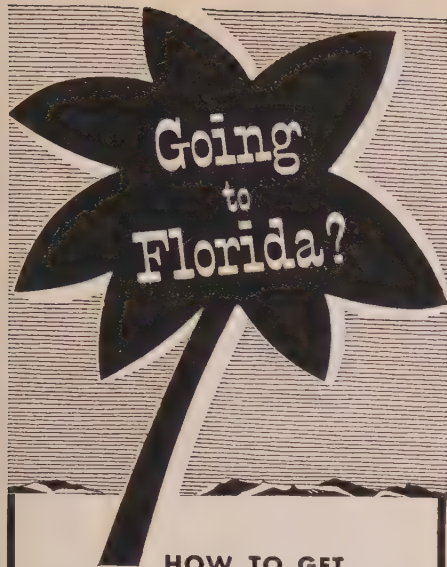
A large number have followed the Secretary's suggestions of remitting for their Certificates and offering their help by writing letters or otherwise. As yet the Exchange List is too small to publish, and since this appeared during the summer vacation, when many teachers and others probably did not see the first announcement, it may be as well to repeat here that we have initiated an Exchange Service whereby members may indicate by the letters B, S, E, any desire to buy, sell or exchange, followed by the items in which they are interested—books, instruments, gadgets, specimens, slides and the like. Drop a postal to Dr. Corrington with this information—it's a free service.

Another forward step is the classification of members according to their interests, so that those with similar aims may correspond direct, and also that literature to be sent from headquarters will go only to those with some interest in the subject.

Affairs have progressed to the point where local Chapters are ready for establishment in a number of centers and schools. The palm again goes to Allentown, Pa., where Marlowe W. Hartung, Jr., has organized the alpha of ASAM. Petitions for Charters are ready and will be sent on request, together with information on requirements. These have been kept to a minimum—five members, with a temporary organization and a name for the Chapter. Upon approval, a Charter will be issued and instructions sent to assist the founders with matters of permanent organization, programs for meetings and exhibits, and suggestions for maintenance, together with certain supplies issued from time to time by the larger optical and supply house companies.

Ready soon will be Service Leaflet No. 1, "Buying a Microscope," which will include many suggestions for all classes of members—beginners and advanced workers—and to fit all ranges of price—on what to look for when buying a microscope. This will be sent to all members who checked their questionnaires or application cards in the space referring to this subject, stating that they intended securing a microscope and wished advice. It will also be sent to other members who wish a copy and will drop a postcard to that effect.

Among new members are: Number One for the Territory of Hawaii—Mr. Kenji Kato, whose address is Ewa, Oahu, T. H., and whose specialty is bacteriology. John Carroll, 5 East State St., Gloversville, N. Y., is a histological technician and has slides of human and animal tissues which he will exchange. Richard F. Rothwell, 2245 Wesley Ave., Evanston, Ill., now retired, was formerly a microscopist in the Metallurgical Department of the Illinois Steel Company. Nine members of the staff of the Spencer Lens Company, Buffalo, N. Y., have joined, including foremen, salesmen, inspectors and clerks. They are all very keen about the ASAM and its possibilities. Dr. L. E. Starr is Assistant Dean of the School of Veterinary Medicine, Alabama Polytechnic Institute.



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ON THE RECORD

Too many people are inclined to think of Victrola recordings in terms of swing music or opera and do not realize the wide range of records available today. Recognizing the great possibilities of education combined with entertainment, both in the home and in the school, RCA-Victor has built up an imposing library of recordings of permanent year after year value. These have none of the transitory significance of the popular song, that today lives a short life. Recordings can be, and are being made for the future, such as the preservation on records of Robert E. Sherwood's Pulitzer Prize play, "Abe Lincoln in Illinois", with Raymond Massey and other members of the original cast doing the recording.

Many records of special interest to those interested in Nature and the outdoors are listed by RCA-Victor. There are, for example, two groups of splendid songs about birds, one selected for the use of children of primary grade age and the other for those of higher grade age. There are recordings of instrumental selections with bird effects, and of instruments imitating bird songs. Two excellent records reproduce bird calls, the imitations having been made by Gorst and Kellogg.

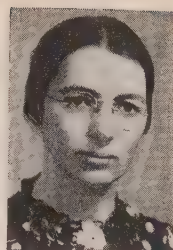
The most recent and interesting additions to this type of record consist of recordings of actual bird songs. One such record (RCA-Victor No. 25765) is that prepared by A. R. Brand of Cornell University and recorded in the outdoors by the interesting method described in an earlier issue of NATURE MAGAZINE. On one side of this disc are the songs of the hermit thrush, wood thrush, brown thrasher and whippoorwill; on the other the songs of the field sparrow, phoebe, blackcapped chickadee and the loon. Every bird lover should have this record.

Similar in idea is a record (V-1) with the actual song of an accomplished canary on one side, and on the other a popular melody played against a background of the songs of nightingales and canaries. Another (V-15) presents a forest concert of bird songs, while another (20968) gives us the breaking of day in an old world garden, with songs of the nightingale recorded in a garden in Oxford, England. Still another record presents some canary solos and folk songs, with which are mingled the calls of canaries and nightingales.

As new recordings of particular interest to lovers of the outdoors are released we will call them to the attention of our readers. Notice will also be given to all records having a particular educational or Nature importance.

Book Bargain

Two attractive books by Clare Leighton, originally brought out by the Macmillan Company at a higher price, are now available for one dollar each. These are *Four Hedges* and *Country Matters*, both earlier reviewed in these pages. Both are charming for their text and for their splendid wood engravings by the author, which illustrate each volume. Here are two books about gardens and Nature in Britain; ideal gifts for the outdoor lover.



Sells 19 Features No. 2
In Six Months

"I have sold, up to date, nineteen features to the Detroit Free Press and have been made their correspondent here," writes Mrs. Leonard Sanders of 218 Union St., Milford, Mich., on completing the N.I.A. course. Her skilful handling of feature stories was the reason given by the editor for her appointment. Mrs. Sanders' first feature was sold less than four months after she enrolled with N.I.A.

How do you know you can't write?

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It is seldom that anyone becomes a writer until he (or she) has been writing for some time. That is why so many authors and writers spring up out of the newspaper business. The day-to-day necessity of writing—of gathering material about which to write—develops their talent, their insight, their background and their confidence as nothing else could.

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Camera Trails

BY NORRIS W. HARKNESS

Close-ups with the Folding Camera

This month we will make use of the suggestions that friendly readers of the department have offered. With the often expressed and really meant desire to make Camera Trails as valuable as possible to its readers, we are grateful for the letters that we have received, and hope that you will let us have your suggestion of what you would most like to see in these columns.

Many of us have folding cameras that operate well for work at ordinary distances but are difficult to use when we want a larger image and must be able to focus on closer objects. The only extra equipment needed is a close-up lens that may be picked up at our dealer's used parts counter. It need not be made especially for our camera, but it ought to fit the rim of our lens well unless we are good enough mechanics to make an adapter that will hold it firmly on the lens absolutely parallel to the metal rim and with the glass as near the lens as possible. If the supplementary lens is not properly lined up, our pictures cannot be sharp.

The lens we want is the double-convex or positive lens like the ordinary magnifying glass, and the shorter its focal length the closer we can focus. We can determine the focal length by using the lens as a burning glass and focusing the image of the sun on a plane surface. The distance from the edge of the glass to the surface when the two are parallel and the spot is at its smallest is its focal length. If we want to know the focal length of the supplementary lens and the camera lens together, we can multiply this measured distance by the focal length of the camera lens and divide the result by the sum of the two. For example, if we have a five-inch lens on the camera and use a three-inch supplementary lens very close to it, the product of the two lengths is fifteen and their sum is eight. Dividing eight into fifteen gives us the focal length of the combination as slightly less than two inches. We know that the bellows of our camera can be extended something more than five inches, so it follows that with the combination we can get an image on our film a little larger than life size.

But we do not know just how to set the focus of the camera when the supplementary lens is in place, and we do not know how much depth of field we have at any given distance. A piece of ground glass, or waxed paper, will enable us to find out. With the back of the camera open, we fasten the ground glass, or paper, with scotch tape so that the ground surface of the glass, or one side of the paper, lies in the plane of the film. The film guides at each side of the picture opening will show us that plane. Now we have a ground glass back for our camera, but we have to remove the film each time we use it and this is not practical. We can get around the difficulty by making a table

that we can carry with us and depend upon in the field.

Set the camera firmly on a table or tripod and place a table lamp opposite the lens with the shade removed. With a fountain pen, make a few lines on the bulb—lines that we shall use to focus on. A tape measure is our only other tool. The first thing we need to know is the distance from the lens to the lines with the lens focused on infinity and then on the other marked distances—the same marks we use to focus the camera in ordinary use. With the focus set to the mark, we slide either the light or the camera back and forth with the lens wide open until we find the exact distance at which the lines are sharpest on the glass. We record this distance and repeat the performance for each of the focusing settings we may want to use. We shall need infinity, the shortest distance marked, and one about half way between at least.

This shows us the distance from lens to object at which we can work, but it does not tell us anything about the depth of field that will be sharp—how much nearer or farther than that distance part of the object can be and still be sharp enough for our purpose. Ordinarily, the depth available with the lens wide open and stopped down all the way will be enough, but it is little more trouble to record the figures for another stop about half way between and the data may be valuable. So we set the lens at infinity again and move back and forth until we find both the greatest and least distance at which the image is sharp on the ground glass. Then we stop the lens all the way down and repeat the moving back and forth. For this the room will need to be dark, except for the focusing bulb, and we shall have to be careful, or, better use a magnifying glass to be certain the lines are really sharp. After we have repeated this with the diaphragm set at $f/11$ or $f/16$, we can focus the camera at another distance and make the new set of measurements. The final table will be like this:

Camera focused on:	Distance:	Depth from: (lens open)	to:
Infinity	30"	27"	36"
10'	22"	19"	28"
5'	16"	14"	20"
Depth from: (f/16)	to:	Depth from: (f/32)	to:
23"	40"	23"	44"
18"	30"	16"	34"
13½"	21"	11"	26"

In use, if we find that we can set the camera 22" from our subject, which is irregular in shape and has one part only 20" from the lens and another 26" away, we could make the exposure with the lens wide open and focused on the ten-foot mark, but we shall get better definition if we stop the lens down a little. As a rule it is better to work at $f/8$, or smaller, if we are going to enlarge the negatives, but a little experience will soon show us just what we can do.

So much for the focusing and the distances at which we can work. But we have two other things to consider, the effect of the shorter focal length—for that is what it is—on the exposure, and parallax, the correctness of the viewfinder. At ordinary distances the viewfinder includes practically the same field that the film will see, but when we work at two feet or less, it will be too much to one side. The best way to correct for this is to observe carefully what is shown in the finder and what the ground glass includes. Then, in the field, we can set up the camera accordingly. Usually it works well

if we include in the angle of the finder just what we want and then move the camera until the lens occupies the place where the finder was. Here, again, experience will make us proficient.

To know exactly what the effect on the exposure will be, we must know the focal length as described earlier. Since the 'f' value marked on the lens is set for the regular focal length of the lens alone, and we have changed it by adding the supplementary lens, the effective 'f' value will be different. In the example given before, the focal length of the lens was five inches and that of the combination was roughly two inches. The 'f' value will change proportionally and we can find what $f/11$ means from the standpoint of exposure by multiplying the marked stop by the new focal length ($11 \times 2 = 22$) and dividing by the focal length of the lens ($22 \div 5 = 4.4$). Thus the 'f' value we should use on our meter in calculating the exposure would be $f/4.5$ when the diaphragm is set on the $f/11$ mark on the lens. It may sound a bit complicated, but it is not, and a little practice will make the whole job almost automatic.

So we find that we have greatly enlarged the field of usefulness of our inexpensive cameras, and we will soon find that making pictures of the little things will give us more fun than we have ever before gotten from our photography.

The Camera Trails Contest

The 1940 Contest will be judged by two men who are outstanding in their own particular fields. As we told you in last month's announcement, we are putting equal emphasis on the pictorial value of the entries and their worth as Nature pictures. To this end we have persuaded Dr. H. E. Anthony, Curator of the Department of Mammals of the American Museum of Natural History, and J. Ghislain Lootens, F.R.P.S., one of the best known teachers of photography in the country, to serve as judges. Each judge will rate the entries as to their value in his special field, and we shall try to make the awards to those that are both good pictures and good Nature work.

The monthly prizes will be your choice of any book from a list that is not yet complete but which will be published next month, and the grand winner at the end of the year will receive a \$25 merchandise order which may be used for any purchase at Willoughby's Inc., 110 West 32nd Street, New York City.

If the entries warrant it, we hope to make up a fifty-print show that will tour the camera clubs of the country during the following year. We hope we can.

Remember that there is a six-week lag between the day the judging is done and the announcement of the results in Camera Trails. Get your prints in early and often.

This and That

Thoughtful movie makers know the need for proper editing of their films to get the full value of the shots they have made, but they also know the difficulty of doing the editorial work without the right equipment. For this work the Craig Movie Supply Company, 1053 South Olive Street, Los Angeles, California, has introduced the CRAIG

PROJECTO-EDITOR for either eight or sixteen mm films. The Projecto-Editor utilizes a new optical principle to allow us to draw the film through the machine as slowly or as fast as we please without any sign of flicker or blur, and the film may be lifted from the guides at any point for marking or cutting. The outfit includes the Craig Junior Rewind and Splicer combination. Please mention this department when you write for your information to the above company.

A good filing system for negatives is invaluable for any photographer. Many of us know how we feel when we begin to hunt for the negative that will make just the picture we want and can't find it! To help us the Bee Bee Negative File and the Bee Bee Filette have been made available. They consist of a box of glassine envelopes to fit your particular film, and a printed index for each group of envelopes. If you are having trouble in this direction, write to Burleigh Brooks, Inc., 127 West 42nd Street, New York City, and ask for literature on these two convenient, American-made files.

If you could not make the kind of Christmas cards you would have liked because you did not have the right negative, remember that the Christmas season itself is the one best time to make the negative you will need next year. The front of the house, or just the doorway makes a good subject when there is snow around, and a shot of the stockings hung on the mantel is splendid. The tree itself is tops, either with or without the family grouped around it. Whatever the subject we choose, it ought to express the spirit of the holidays and there is no better way to catch the idea on our film than to make the shots when we and all around us are full of that spirit. Furthermore, when we have made the negative that really thrills us for our cards a whole year ahead, we can do the printing whenever we wish to and not have the awful rush that we too often have to get them into the mail in time.

Willoughby's Inc., of 110 West 32nd Street, New York City, has just issued a new catalog called *Dark Room Aids* with information on Easels, Tanks, Print Dryers, Printers and the other things that help so much in the dark room. Please mention Camera Trails when you write for your copy.

The Nature photographer can make better use of flash bulbs than any other kind of picture maker with the possible exception of the news man. We have assembled a number of pamphlets from the various manufacturers of most of the bulbs and synchronizers. We will be glad to send these to all readers who send a three-cent stamp with their request for this material. Incidentally, a synchronizer makes a grand Christmas present for the photographic member of the family.

The Editor gives this space to Nature photographers for their own, but it can really

belong to those photographers only if they make it theirs. In other words, Camera Trails is operated for you, and we want it to include the things that will be of the greatest help to you. But we are not mind readers and we can not put what you want into these columns unless you let us know just what you would prefer. So please drop us a line listing the subjects we ought to talk about, and any other suggestions you may wish to offer? We'd appreciate it. And if we can help to solve some photographic problem, please do not hesitate to ask. Address your letters to Norris W. Harkness, Camera Trails, NATURE MAGAZINE, 1214 Sixteenth Street, N. W., Washington, D. C.

Photographic Salon

Youthful photographers are being invited to exhibit their prints at the annual Scholastic Salon of Photography to be held by the American Institute of Science and Engineering Clubs from February 17 to 25, 1940. Members of camera clubs and junior and senior high school students interested in good photography are urged to write to the American Institute, 60 East 42nd Street, New York City, for the Salon booklet and information, rules and an entry blank. The closing date for entries is January 31, 1940.

Essay Contest

An essay contest, open to all Nature lovers and offering cash prizes totaling \$225, is announced by Claremont Colleges, Claremont, California. Manuscripts submitted should be of suitable length for magazine publication but should not exceed 3000 words. The contest closes February 1, 1940. This project has been made possible by contribution of an anonymous donor, and is known as the John Muir Nature Enterprise. Complete information may be obtained by writing to John Muir Nature Enterprise, Room 100, Harper Hall, Claremont, California.

Camera Subjects

It takes "news sense" to make an outstanding newspaper man, and it takes picture sense to make a notable photographer. While such senses are instinctive with some people, they can be acquired to a considerable degree by thought and study. For the photographer the new book by Jacob Deschin, *Finding New Subjects for Your Camera*, performs such a task. It is published by Whittlesey House at \$2.50, and is commended to the attention of aspiring wielders of cameras.

The Garden in Color

Published originally at ten dollars, *The Garden in Color*, by Louise Beebe Wilder, has now been brought out by Macmillan in a less expensive edition for \$2.95. Textually the book is divided into four parts covering the seasons. Three hundred and twenty natural color reproductions cover some five hundred different flowers popular in American gardens.



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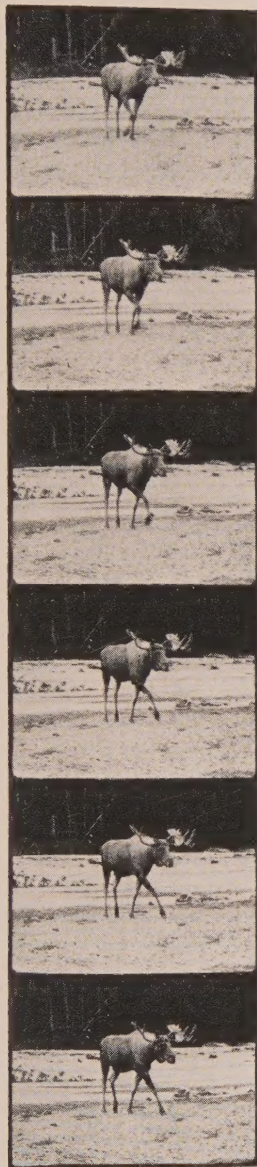
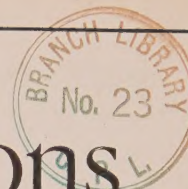
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Thirteen reels are now available in three groups. A fourth group is in preparation.

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33. *Nature's Side Show*: The struggle for existence in the arid southwest.
34. *Queer Creatures of the Cactus Country*: A study in the adaptation of wild-life to a harsh land.
35. *Getting Personal with Mountain Lions*: A thrilling picture of a pack trip into lion country.

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The Association will pay expressage or postage when films are shipped to customers. The customer will pay return mailing charges and will be responsible for films until returned to 1214 Sixteenth Street, N.W., Washington, D. C. Rentals will be shipped C. O. D. unless paid for in advance.

Films are to be shipped back the day after showing. No extra charge for time consumed in transit. When reservations are made, customers are urged to select 1 or 2 alternate choices.

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Indoors and Out

By HOWARD ZAHNISER

ONLY a very few readers of NATURE MAGAZINE need an introduction at this late date to Henry David Thoreau, but I am confident that there are none who are not further interested in his writings and in the experiences that made up his life.* It is hardly true, as many have believed, that Thoreau was a failure in his own lifetime, but it is true that his importance has been appreciated more and more highly through the years, and his reputation is growing. My friend J. S. Wade has compiled what he modestly calls "A Contribution to a Bibliography from 1909 to 1936 of Henry David Thoreau" and has published it in the Journal of the New York Entomological Society (Vol. 47, pp. 163-203, June, 1939). The bibliography itself for these twenty-seven years includes thirty-seven pages of lists. Mr. Wade points to this length as a measure of "the growth and permanence of Thoreau's fame," and says it takes on "an added and touching significance to those who love his writings and revere his memory."

Most of those who go to Thoreau for enjoyment, I believe, seek out his records and accounts of the many hours he spent outdoors. Thoreau died when he was only 45, and he never got around to compiling his book on the outdoors, his atlas of Concord, his calendar of Nature, or whatever it might have been called. He planned such a work, but the contents of it at his death were scattered through his journal. H. G. O. Blake edited selections from the journal in four volumes, arranged the selections according to the seasons, and published them as *Early Spring in Massachusetts, Summer, Autumn, and Winter*. Miss Bertha Stevens, who teaches science at the Avery Coonley School in Downers Grove, Illinois, has recently made her own selection for a one-volume work which she calls *Thoreau, Reporter of the Universe*. It is interesting to know that Miss Stevens was encouraged to do this work by the response she had received from her use of Thoreau in her science classes. She feels confident that her selections will appeal to children as young as eight but also that they will interest anyone up to eighty—and I believe it was only euphony that made her stop there. The book is illustrated with a few of the rough sketches from Thoreau's journals, and with eight plates reproducing paintings or engravings, four by George Inness, Jr., and one by Rowland E. Robinson. It includes a map of Thoreau's travels in and near Concord. This is an excellent selection of what Thoreau had to say about the outdoors. Seventeen times the

reader of this book can go through the year with Thoreau, each time following some particular interest. "Musical News," "The Clock of the Seasons," "News of Plants," "Forces Which Make and Unmake the World," these are examples of the headings under which Miss Stevens has grouped her selections.

Miss Stevens's book is the sort of thing we have expected of Thoreau anthologists, but Theodore Dreiser has compiled a group of selections that is different, one that will appeal to those interested in philosophy. He has arranged his selection of *The Living Thoughts of Thoreau* under the following main headings: The Universe, Pantheism, Knowledge, Problems of Morals, Free Will—Necessity, Good and Evil, The Emotions, Society, Social and Religious Institutions, On Friendship, The Good Life, Art and Beauty, Progress, and Death.

Both Miss Stevens and Mr. Dreiser are convinced of the permanence of Thoreau. Miss Stevens says: "His writings are dateless and ageless—because he dwelt in the universe more than in Massachusetts." Mr. Dreiser declares: "The man is a world genius, like Shakespeare, like Plato, like Whitman, much more related to all nature and time and change than to Concord or the United States." Mr. Dreiser's book is being published in fifteen countries, and is likely to enhance Thoreau's reputation further.

The two aspects of Thoreau represented by Miss Stevens and Mr. Dreiser are recognized in Henry Seidel Canby's newly-published biography, which is told in two parts, "Adventurer in Life" and "Naturalist and Nature Writer." This is undoubtedly the outstanding Thoreau item in a long period, probably since the publication of the journals in 1906, and in the whole field of biography it is one of the most significant books of the year. It has been a long time since a full-length biography of Thoreau has been written. There have been discoveries of fact and developments in understanding. For one thing, Thoreau's relations with women are more fully understood; I imagine that even Thoreau would learn more of himself if he could view his experiences through our psychological eyes, and like all of us he would probably first be tempted to blush. This new biography is the most comprehensive and most thorough discussion of Thoreau yet written. It replaces all other biographies for the library, and it should be on the current reading list of every American reader.

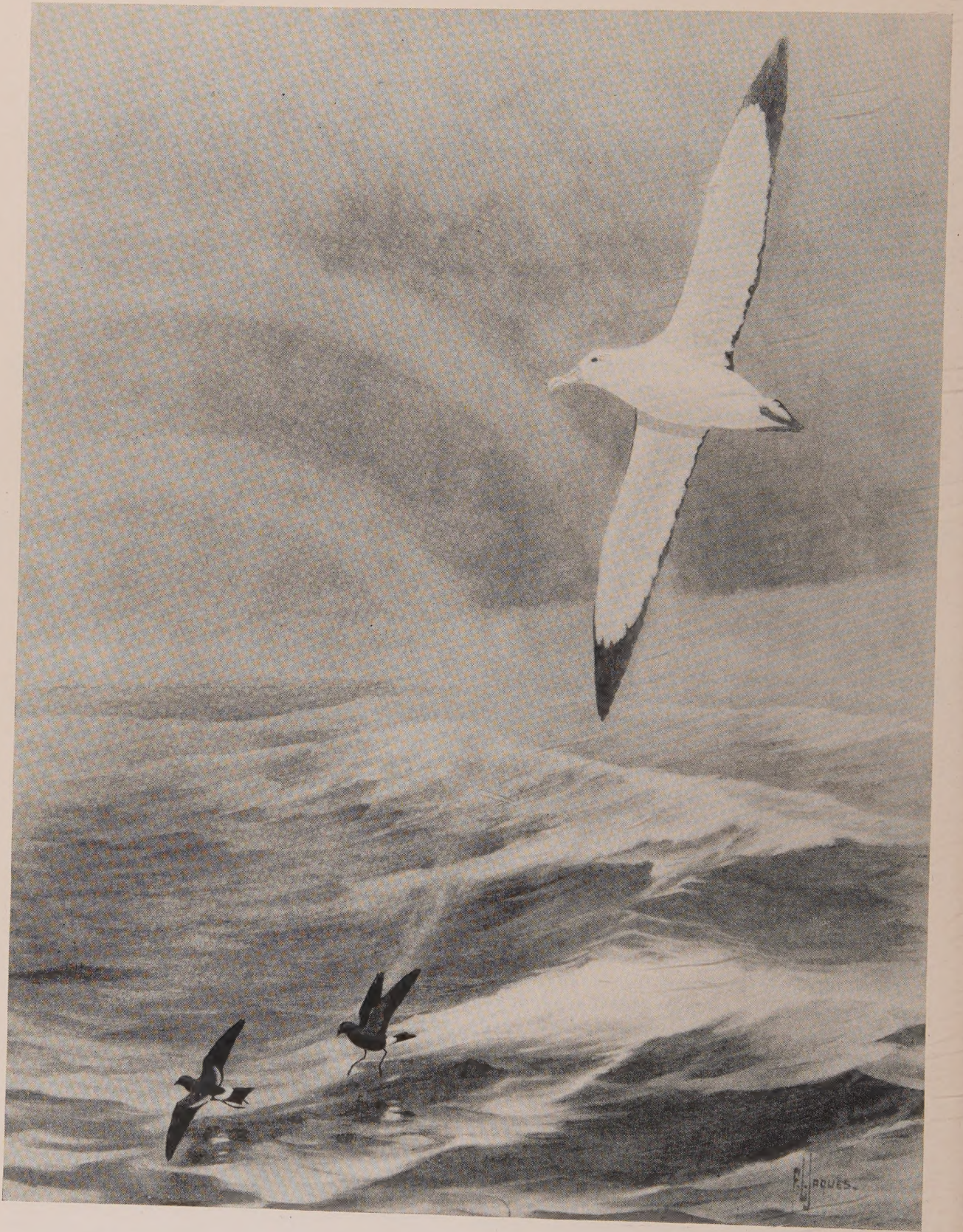
Mr. Canby is calm and scholarly almost to the denial of enthusiasm, and the breadth of his treatment sacrifices incisiveness. The work lacks the sting and flavor and zest of Thoreau himself. Its compensating virtue in this respect is that one can read it without suspicion of special pleading. It is delightfully written. One has the impression throughout of attending to a discussion of Thoreau, not of reading an account of biographical facts. The facts are there all right and precise, but Mr. Canby seems in a pleasing manner to take them for granted in his discourse. It is a kind of biography that ap- (Continued on page 597)

*Recently published books discussed on this page are:

The Living Thoughts of Thoreau. Presented by Theodore Dreiser. The Living Thoughts Library, edited by Alfred O. Mendel. New York: Longmans, Green and Co. 1939. 162 pp. \$1.

Thoreau. By Henry Seidel Canby. Boston: Houghton Mifflin Company. 1939. 508 pp., with index and selected bibliography. \$3.75.

Thoreau, Reporter of the Universe: A Selection of His Writings about Nature, for All Readers from Eight Years Old to Eighty. Selected and arranged by Bertha Stevens. New York: John Day Company. 1939. 229 pp. \$2.50.



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